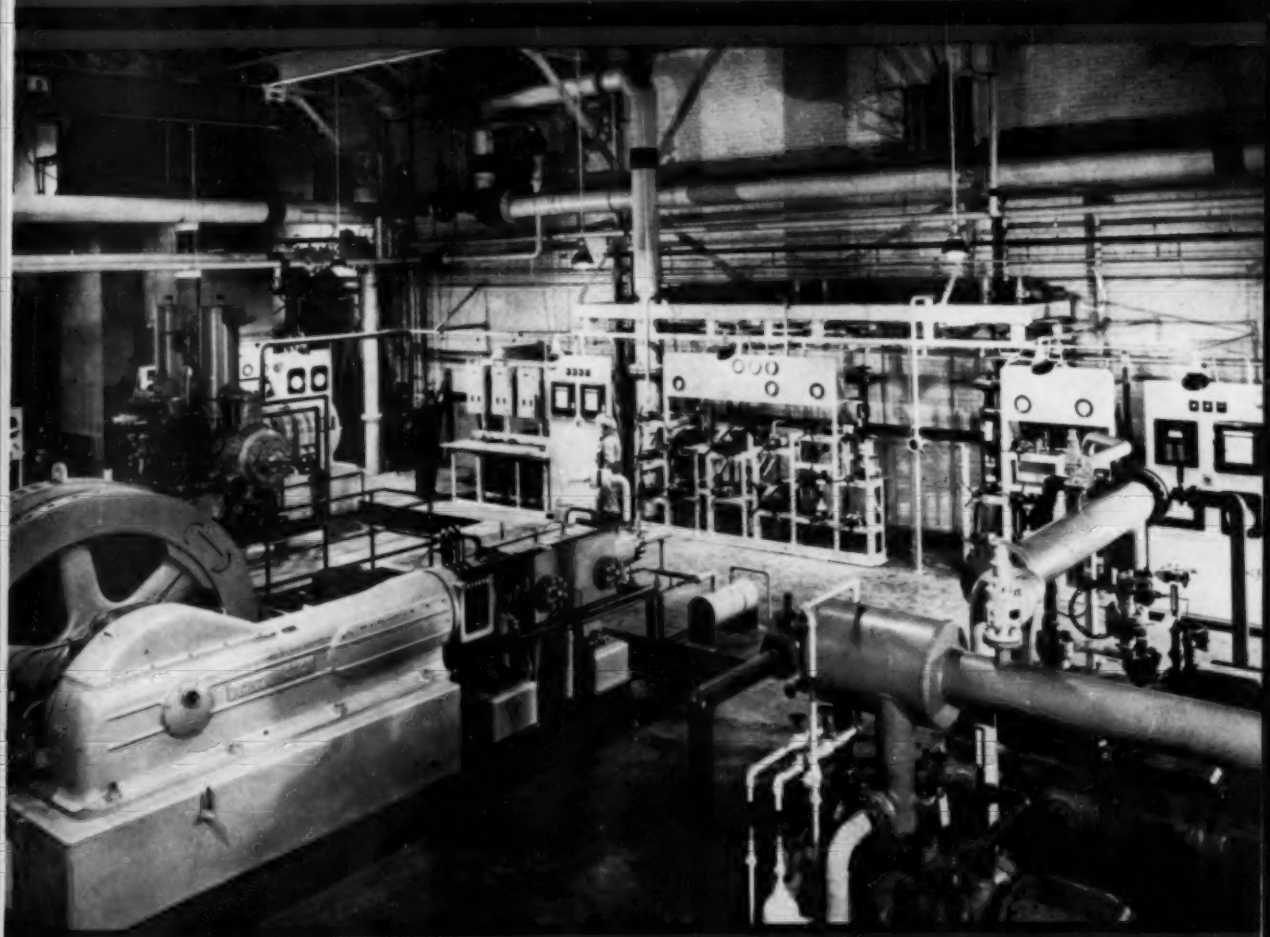
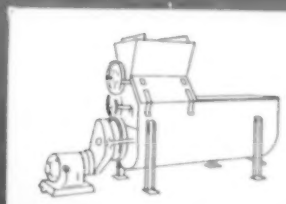
Vol. 7, No. 6 JUNE, 1952

AGRICULTURAL CHEMICALS



In This Issue:

Fertilizer Safety Movement Grows • Action of Systemic Insecticides • U.S.D.A. Fertilizer Consumption Report Natl. Fertilizer Assn. to Greenbrier • S. Carolina Fertilizer Conference Report • Amer. Plant Food Council Meets • New Laboratory for Hercules • Ryania for Corn Borer Control • 3 Fertilizer Safety Meetings Held



avoid the risk of
an idle mixer with

POWCO BRAND

Cube

DDT
TOXAPHENE
BHC
CHLORDANE
LINDANE
ROTENONE
SABADILLA
PYRETHRUM & PYRIN
PIPERONYL BUTOXIDE
ALLETHRIN
ANTU
TEPP
PARATHION
ALDRIN
2, 4-D & 2, 4, 5-T

POWCO

KILLING POWER—THAT'S THE THING!

An assured supply of POWCO BRAND CUBE—a basic and widely used insecticide material—will be your insurance against the risk of mixer-idleness.

POWCO BRAND CUBE is backed by 20 years experience in selecting and grinding rotenone-bearing roots.

Quality Cube for *tomorrow* can be assured *today*. Write *now* to arrange for your future supplies.

John Powell & Co., Inc.

ONE PARK AVENUE, NEW YORK 16, N. Y.

Sales Offices: Philadelphia · Pittsburgh · Chicago · Huntsville · Fort Worth · Omaha · San Francisco

Representatives in Principal Cities of the World

LOOK TO POWELL...FOR CONSISTENT, TROUBLE-FREE QUALITY

Why is Attaclay's conditioning ability important?

Seventh of a series designed to tell the story of the pesticide industry's leading carrier and diluent.

Because it gives dusts... and their field use... a whole new value

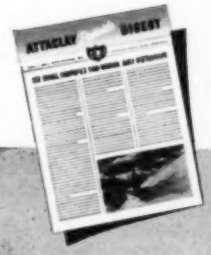
Dust conditioning (to the degree imparted by Attaclay) is money in the bank to primary-base manufacturers, blenders and growers.

Dust bases and wettable powders formulated with Attaclay have "built-in" conditioning. They are dry, loose and free-flowing when produced—and stay that way until used. Blenders sum up such products in a word—"premium."

Which is why Attaclay is also on the blenders first team. Used as straight diluent, it puts the same high quality into *his* finished products. Or—in conditioner percentages—upgrades any field strength dust and makes it freer flowing. Or adjusts bulk so that the entire line of dusts has near-uniform volume, permitting standardization of container size and minimizing rate adjustments on dusters.

"Attaclay-conditioned" means much to the grower, too. Free-flowing, Attaclay-based wettable powders disperse more readily and suspend more effectively in spray tanks. Attaclay-mixed dusts are noted for their ability to flow, disperse, settle, cover, stick and kill.

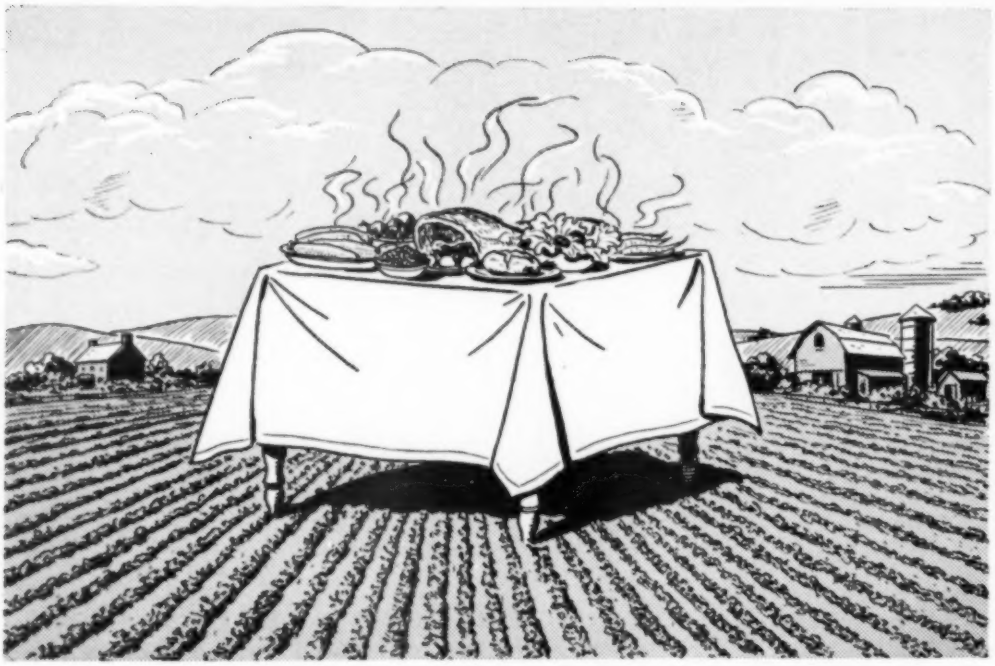
Conditioning — from formulation to kill — is just one of Attaclay's proven abilities. May we assist you in getting the whole story?



ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Phila. 5, Pa.

YOUR PROBLEMS DISCUSSED. *Various aspects of pesticide processing are discussed in Attaclay Pesticide Digest. A brief note will bring back copies while they last, and future issues as published. Write today.*



The biggest table in the world

IT cannot be measured, or weighed, or fully appraised, yet it is the largest on earth . . . The American Table. The largest, and certainly the most envied . . . for mouths the world over water at the mention of the food it serves in such variety, quality and abundance.

Abundance? Today, yes. But, tomorrow? The question can be answered only by the four great correlatives—*farmers . . . science . . . fertilization . . . soil conservation.* It cannot be answered by "more acreage," because "more acreage" does not exist. There are more mouths to feed each year, and less acres per person.

For years the Synthetic Nitrogen Products Corporation has been stressing the urgency of *increasing* fertilization to compensate for a *diminishing* acreage, and the need for greater yields per acre through the use of more fertilizer as the only way to maintain abundance, or even sufficiency.

SYNTHETIC NITROGEN PRODUCTS CORPORATION

285 Madison Avenue, New York 17, N. Y.

CAL-NITRO* TRADE MARK REG. U.S. PAT. OFF.

The Nitrogen Topdresser

POTASH

Muriate—50% and 60% K_2O

Sulphate—90-95% K_2SO_4

*The Synthetic Nitrogen Products Corporation owns the trade-mark "Cal-Nitro," which is used to designate a nitrogen fertilizer compound.

AGRICULTURAL CHEMICALS

THIS MONTH'S COVER

Interior of two-million-dollar anhydrous ammonia unit of Hooker Electro-Chemical Company plant now operating at Tacoma, Washington. Output of plant is geared to needs of chemical industry in the Pacific Northwest. Ammonia produced by the plant will be shipped entirely by tank car.

VOL. 7 No. 6
JUNE 1952

In This Issue:

A Monthly Magazine For the Trade

LAWRENCE A. LONG
Editor

AGRICULTURAL CHEMICALS

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Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

CLARENCE CHASE

Fertilizing pastures with 10-10-10 produced an extra $90 worth of dairy feed per acre for Gale and Clarence Chase,

SUN PRAIRIE, WIS.

THE CHASE BROTHERS of Sun Prairie, Wisconsin were among farmers who cooperated in the pasture improvement program sponsored by the University of Wisconsin under the Direction of C. J. Chapman, Professor of Soils. Here's their report:

"We fertilized part of our pasture last spring with 10-10-10 at about 500 pounds per acre. The growth of grass was so rank we could have cut a hay crop by the middle of June.

"In a demonstration set up on our pasture by the county agricultural agent, yields were taken. The unfertilized area made 2531 pounds of dry material per acre, and the fertilized made 5737 pounds per acre, an increase of 2905 pounds. This extra feed was the equivalent of 16-18% dairy feed which, at $60 a ton, would be worth about $90."

GALE CHASE

Bigger yields for farmers mean better business for you

● High-nitrogen mixed fertilizers have proved again and again that they pay their own way and give the user a nice profit to spare. As farmers learn more about their benefits, demand goes up and up.

To give your customers the most effective high-nitrogen fertilizers, use U·S·S Ammonium Sulphate for a major part of the nitrogen content. It's a dry, free-running material that stands up well in storage and performs well in distributing equipment. Its all-ammonia nitrogen won't leach, yet becomes readily available during the growing season.

Promotion efforts you put behind high-nitrogen fertilizers containing U·S·S Ammonium Sulphate will yield big returns. You and your dealers can recommend it for pastures, corn, wheat and other small grain. The spring fertilizer season is at its height; get your share of this business. United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S AMMONIUM SULPHATE

USS

UNITED STATES STEEL

"... and no place to go"

Hoppers are finding it tougher and tougher to find unprotected crops and range to ravage. Millions of acres in our western states, in Canada (and across the sea too!) were cleared of grasshopper infestations by aldrin last year.

Everywhere its amazing power (just 2 ounces per acre!) has made aldrin the No. 1 hopper-stopper of all time. Not only its incredible killing power, but its low-cost-per-acre economy have made aldrin the universally preferred control for the dreaded grasshopper.

Apply aldrin by air or ground equipment ... it kills with either method. Just be sure you order your aldrin early ... and order enough!

aldrin

SHELL CHEMICAL CORPORATION

WASTELAND TO PASTURE

Under the heading, "Good News," a current magazine reports that 110,000 acres in a midwestern state, once part of the nation's dust bowl, will feed one million pounds of beef this year.

This is the great value of grasslands farming. To help reclaim and make productive many other millions of acres is the goal of the Green Pastures program to which P. C. A. pledges full cooperation.

POTASH COMPANY OF AMERICA
Carlsbad, New Mexico

GENERAL SALES OFFICE . . . 1625 Eye Street, N. W., Washington, D. C.
MIDWESTERN SALES OFFICE . . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . . Candler Building, Atlanta, Ga.

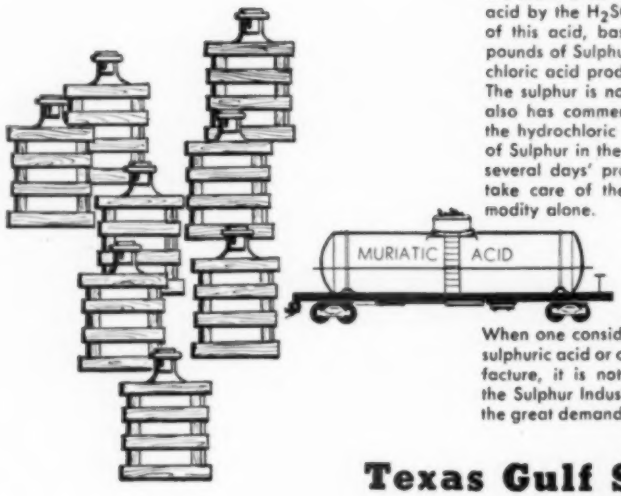
Sulphur

Loading a ship with Sulphur at Galveston

Thousands of tons mined daily, but where does it all go?

PARAPHRASING an old saying: 'It takes a chemical to make a chemical,' certainly applies to hydrochloric acid.

No chemical engineer has to be told how hydrochloric acid is made but sometimes with the mind focussed on the word "hydrochloric" little thought is given to another word "sulphuric." It is this word that calls attention to the fact that to make one net ton of 20° Bé hydrochloric acid by the H_2SO_4 process requires about 950 pounds of this acid, basis 100%, which is equivalent to 320 pounds of Sulphur. About one third of the annual hydrochloric acid production is made by the use of sulphuric. The sulphur is not lost because salt cake, a by-product, also has commercial value. But any way you figure it, the hydrochloric acid industry is an important consumer of Sulphur in the form of sulphuric acid. In fact, it takes several days' production from all the Sulphur mines to take care of the annual production of this one commodity alone.



When one considers all the other chemicals that require sulphuric acid or other Sulphur compounds for their manufacture, it is not difficult to appreciate how faithfully the Sulphur Industry is serving industry today in spite of the great demands made upon it.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

DIRECT FEEDING . . . with Monsanto soluble plant nutrients

Soluble plant-nutrient chemicals by Monsanto are being formulated into fertilizer solutions, providing direct feeding to plants of nitrogen, phosphorus and potassium without harm to leaf crops. Immediate solubility, when applied directly to plants, is a characteristic of solutions of Di Ammonium Phosphate, Mono Ammonium Phosphate, Mono Potassium Phosphate and Phosphoric Acid 75%. They also are available for dry applications.

Shipped in appropriate containers, these chemicals are being used by fertilizer manufacturers in processing specific formulations for soil dressing or direct-to-plant applications. Standard farm equipment is used for either spray or solid application. For information concerning this available supply of plant-nutrient chemicals, contact any District Sales Office, or write MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700-B South Second Street, St. Louis 4, Mo.

☆ ☆ ☆ ☆

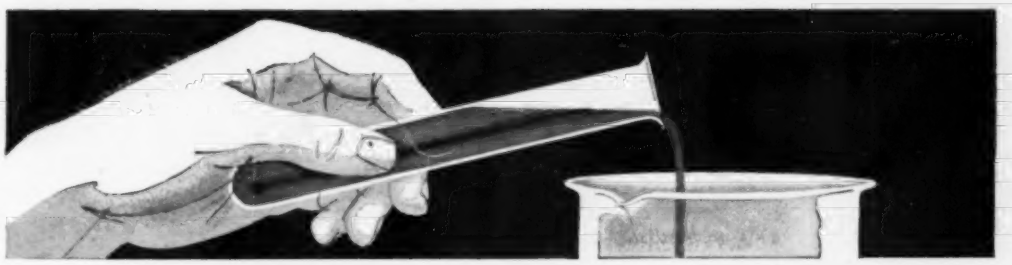
DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

MONSANTO PLANT NUTRIENT CHEMICALS			
	N	P_2O_5	K_2O
Mono Potassium Phosphate (Crystals)	—0—	51.6%	34.2%
Di Ammonium Phosphate (Crystals)	21.0%	53.85%	—0—
Mono Ammonium Phosphate (Crystals)	12.2%	61.61%	—0—
Phosphoric Acid (75.0%) (Liquid)	—0—	54.5%	—0—

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

from
THIS
stage...



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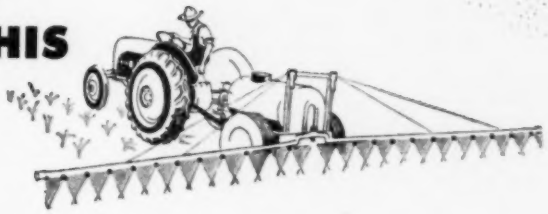


DOW agricultural chemicals
are top quality!

QUALITY is the biggest factor in selecting chemicals for farm use—and QUALITY is the word for Dow Agricultural Chemicals! They're the *best* that Dow research and nearly 50 years' manufacturing experience can produce.

There is no guesswork in the choice and use of these *proved* aids to better farming. Many years are spent in developing recommendations that you can depend upon. The instructions on the label of every Dow product are the result of extensive laboratory testing *plus* field testing in cooperation with federal and state agencies and private growers.

We invite you to look first to Dow's complete line of QUALITY agricultural chemicals for supplying your needs. Our trained sales and technical men are available to help you with your problems. Just call the nearest Dow sales office or write direct to Midland.

THE DOW CHEMICAL COMPANY
Agricultural Chemical Department • Midland, Michigan
New York • Boston • Philadelphia • Atlanta • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

DOW
CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE

USE DEPENDABLE DOW AGRICULTURAL CHEMICAL PRODUCTS
WEED, BRUSH AND GRASS KILLERS • INSECTICIDES
FUNGICIDES • PLANT GROWTH REGULATORS
GRAIN AND SOIL FUMIGANTS

FOR EVERY PROCESS OF

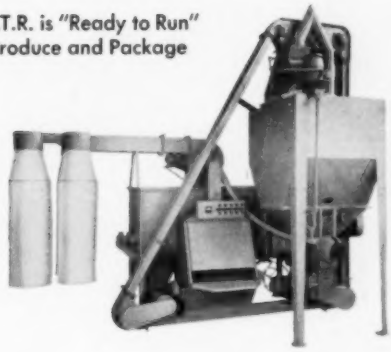
INSECTICIDE PRODUCTION...

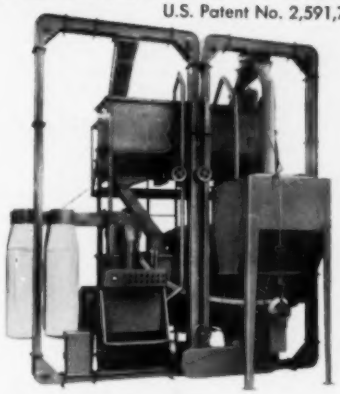
Equipment of Proved Performance at Minimum Cost

Poulsen R.T.R.* **UNI-BLENDER COMPOUNDING PLANTS**

U.S. Patent No. 2,591,721

*R.T.R. is "Ready to Run" —Produce and Package

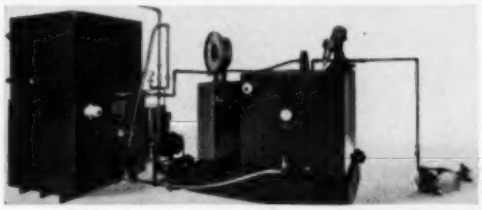




STANDARD TYPE R.T.R. Uni-Blender Compounding Plant is designed to mix and blend dust concentrates with diluents to produce and package ready to use, field strength insecticides of consistently uniform quality. The complete plant requires only 9'x12' of floor space and 13' of head room. Produces up to four 40 cu. ft. batches per hour *with only one operator.* Users report production of 29,000 pounds in 5 hours with two operators.

DUAL TYPE R.T.R. Uni-Blender Compounding Plant is designed to perform a dual function . . .(1) to formulate dust concentrates . . .(2) to produce field strength insecticides. Users claim this provides the most economical insecticide formulating equipment available. Handling 40 cu. ft. batches, the complete plant requires only 11'x11' of floor space and 16' of head room.

Both Standard and Dual types are available for immediate shipment.



R.T.R. Melting & Liquefying Equipment . . . R.T.R. Liquid Injection Equipment provide for liquefying and injection of specific technical grade toxicants required for the formulation of numerous concentrates and liquid sprays.

Write for descriptive bulletins

A. E. POULSEN & CO.

Established 1939

3305 East Slauson Avenue, Los Angeles 58, California

Engineers and Manufacturers

Materials processing and materials handling equipment

Everyday more and more farmers throughout the world depend on chlordane for effective control of a wide variety of insect pests.

Ease of formulation and variety in applications gives chlordane high prominence also as an economical insecticide.

Consult your dealer, Farm Advisor, County Agent . . . or write to us for full details.

Depending upon the specific soil insect, apply by one of these easy methods:

1. DUST OR SPRAY either the surface of the ground or mix with the top few inches of soil.
2. WATER EMULSIONS applied to TRANSPLANT WATER.
3. DUST applied as a ring around newly transplanted plants.
4. DUSTS COMBINED with fertilizers and applied to the soil.

CONTROLS THESE INSECT PESTS

Alfalfa Weevils
Ants
Cabbage Maggots
Chiggers
Cotton Boll Weevil
Citrus Ants
Cutworms
Earwigs
Grasshoppers
Leaf Miners
Lygus Bugs
Mole Crickets
Mormon Crickets
Onion Maggots
Onion Thrips
Plum Curculio
Seed Corn Maggots
Sod Webworm
Stink Bugs
White Grubs
Wireworms

HOUSEHOLD PESTS TOO:
Ants
Roaches
Flies
Crickets
Silverfish
Spiders
Termites

. . . AND MANY OTHERS

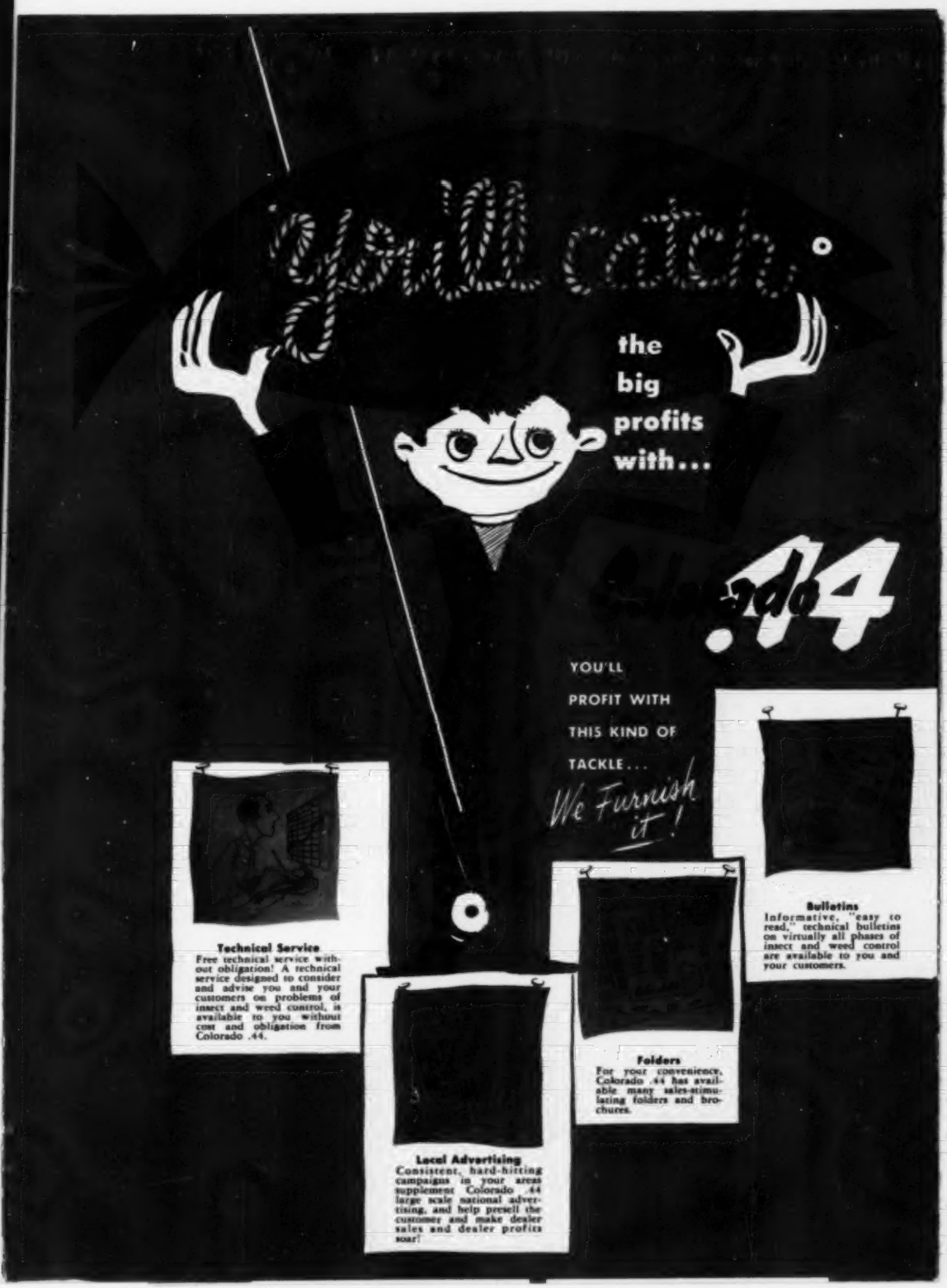
VELSICOL CORPORATION

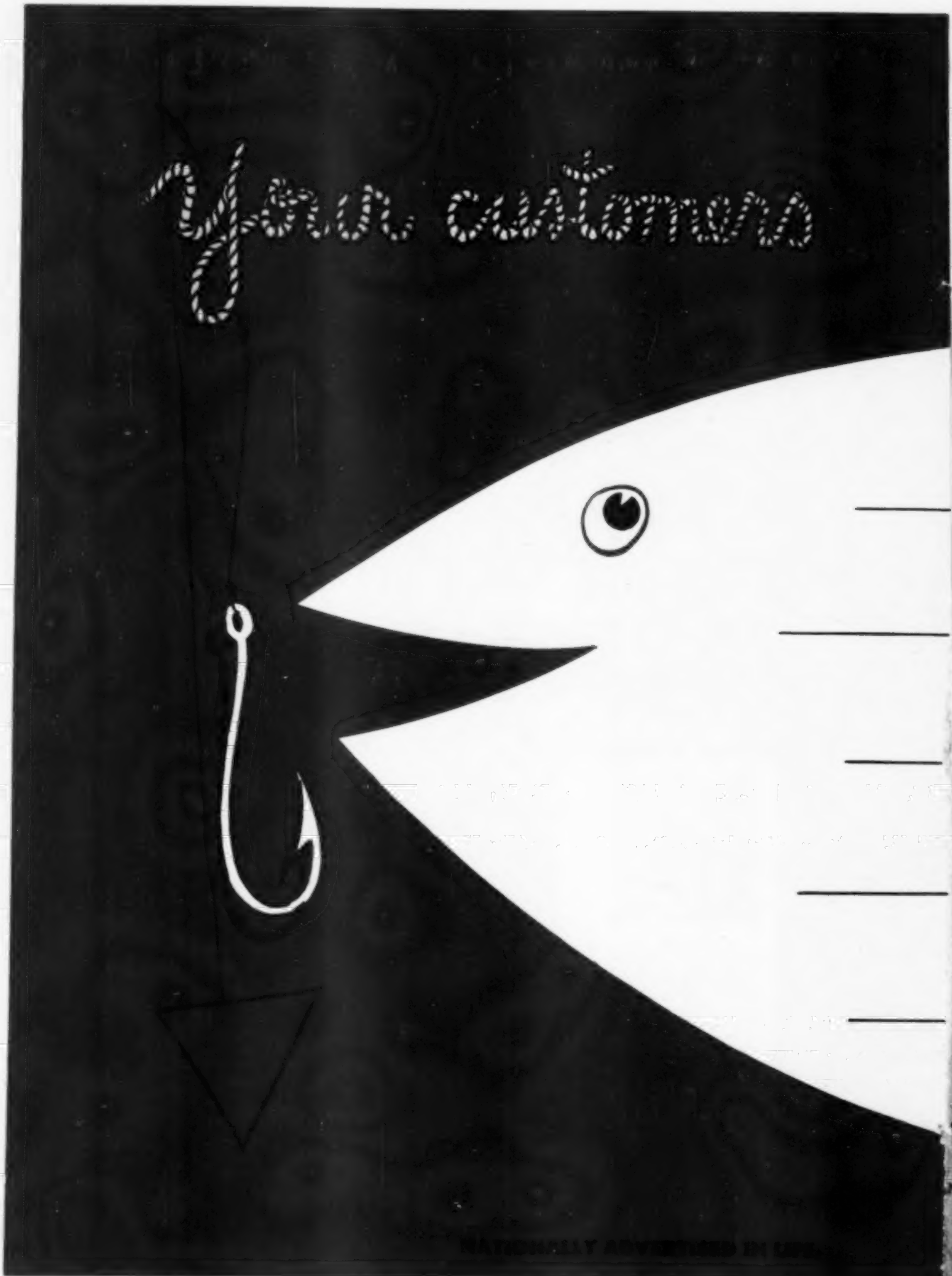
General Offices and Laboratories
330 East Grand Avenue, Chicago 11, Illinois

Export Division
100 East 42nd Street, New York 17, New York

REPRESENTATIVES IN PRINCIPAL CITIES

PETROLEUM DERIVED CHEMICALS
VELSICOL
SERVING BASIC INDUSTRIES


You'll catch
the
big
profits
with...
.44
YOU'LL
PROFIT WITH
THIS KIND OF
TACKLE...
We Furnish it!
Technical Service
Free technical service without obligation! A technical service designed to consider and advise you and your customers on problems of insect and weed control, is available to you without cost and obligation from Colorado .44.
Local Advertising
Consistent, hard-hitting campaigns in your areas supplement Colorado .44 large scale national advertising, and help presell the customer and make dealer sales and dealer profits soar!
Folders
For your convenience, Colorado .44 has available many sales-stimulating folders and brochures.
Bulletins
Informative, "easy to read," technical bulletins on virtually all phases of insect and weed control are available to you and your customers.


Your customers
NATIONALLY ADVERTISED IN LIFE

get the

TOXAPHENE
For better, more economical control of a wider variety of agricultural pests, we suggest Colorado .44 Toxaphene in various combinations and formulations. Colorado .44 Toxaphene is especially potent when used against grasshoppers, alfalfa weevils, armyworms, cutworms, lygus bugs and a variety of cotton pests.

BHC
If you're in the market for a profitable item for effective control of cotton and livestock pests, don't overlook Colorado .44 BHC. Show the farmers how they, too, can reap greater benefit through Colorado .44 BHC.

LIVESTOCK SPRAY
To stop livestock weight losses resulting from ticks, lice and flies, recommend Colorado .44 Gold Star Barn and Livestock Spray to your customers. It's the best solution for adding pounds to cattle and other livestock, because it eliminates the annoyance of weight reducing pests. Mixes easily in hard or soft water.

CHLORDANE CONCENTRATE
For the customer who prefers to mix his own solutions, suggest Colorado .44 Chlordane Concentrate. Extremely economical, yet effective for grasshopper, alfalfa looper, armyworm, and many other insect pests.

COTTON DUSTS
Here are more Colorado .44 products which can be applied with airplane, ground or hand equipment. Colorado .44 Cotton Dusts—in all formulations and combinations—are highly effective against boll worms, cotton leaf worms, boll weevils, thrips, and other cotton damaging bugs.

PARATHION
Recommend Colorado .44 Parathion. This versatile insect killer destroys the *green bug* in wheat and all small grains. Carry Colorado .44 Parathion and make your profit and the farmers' income greater. Also unusually effective against aphids, armyworm, citrus scales and many other destructive insects.

DAIRY SPRAY
Profit-eating livestock pests die fast when Colorado .44 Dairy Spray is used. This powerful insect killer will not harm cattle or humans if used as directed. It's a fast seller, and is fully approved by the USDA for use on dairy cattle. Non-toxic, non-injurious to livestock, poultry and warm blooded animals when used as directed.

ALDRIN
Here's a versatile, fast-moving item which will sell because of its effective action against boll weevils, grasshoppers, locusts and many other destructive pests. Colorado .44 Aldrin features quick action, low-dosage ease of use, economy.

2,4,5-T
For the elimination of heavy brush, there's completely effective control to be found in Colorado .44 2,4,5-T. Available in many combinations to meet any kind of control desired, Colorado .44 2,4,5-T offers sure elimination of mesquite, scrub oak, stumps and other heavy brush.

DDT
Sell widely used Colorado .44 DDT to farmers and watch your profits soar! This is a particularly profitable item to sell in the corn belt because of its effective control of the *European Corn Borer*. Also can be used for high percentage kill of the alfalfa weevil, lygus bug, and countless other destructive insect pests.

LINDA
For su
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and sinker

NDANE

r sure, easy control of lice, flies and
es on livestock, recommend Colorado
4 Lindane. Customers will appreciate
e outstanding results of Lindane in
ntrolling livestock pests. Lindane is
o formulated to destroy many other
ricultural insect pests—including grass-
ppers and ants.

HLORDANE

stocking up on Colorado .44 Chlor-
ne, you insure having on hand a
ick, and permanent knockout for all
beat insects. It's easy to sell consumers
the idea that crop losses can be eradi-
ted by Colorado .44 Chlordane's triple
lling action, which kills by vapor,
omach poison, and contact.

4-D

eeds that rob crops of moisture, sun-
ght and vital minerals are always a
oblem to farmers. With Colorado .44
4-D ester and amines in many economi-
al formulations and strengths, weed
d brush control can be achieved at a
inimum of cost and labor. Mix in oil
d water. Now, a new wonderful fea-
re of Colorado .44 2,4-D Amine form-
ations. They will not freeze or go out
solution—even at *zero temperature!*

RUB DUST

olorado .44 Grub Dust gives almost
0% protection against cattle grubs and
e, thus reducing livestock weight losses.
n be used as dust, dip or spray. Just
d a 7½ lb. pack of Colorado .44 Grub
st to each 100 gallons of water... it
lls cattle pests fast! Profits come nat-
ally.

Chemicals

PANY

-DDT-SL, Phygon Seed Protectant,
able, Phygon-XL—insecticides—
n Rose Dust—miticides—Aramite.

Specialized products

COTTON SPRAYS AND DUSTS

SPRAYS—Colorado .44 manufactures 9 varieties of Cotton Spray Concentrates. In all combinations—Aldrin, DDT, Dieldrin and Sulphur.

DUSTS—Colorado .44 formulates many combinations of Cotton Dusts, including those with Sulphur, DDT, Toxaphene, Dieldrin, Aldrin and BHC.

AIRPLANE SPRAYS AND DUSTS

Colorado .44 manufactures 153 products especially compounded for airplane application. Included are:

- Aero Butyl Ester 2,4-D
- Super "80" Butyl Ester 2,4-D
- Super Chlordane Concentrate
- Super Toxaphene Concentrate
- Super Parathion Concentrate
- Super Aldrin Concentrate
- Aldrin Equivalent Oil Concentrate

CORN INSECTICIDES

Colorado .44 DDT formulations provide *SURE* protection against corn borers and other destructive and costly corn insects. For greater sales and increased profit, feature the following:

- DDT-Emulsion Concentrate
- DDT-Wettable Powder
- DDT-Dust Concentrate

These, and other Colorado .44 insecticides are available for you today!

ALFALFA INSECTICIDES

Recommend these Colorado .44 products to farmers for faster knockdown, faster kill, and longer lasting killing power of destructive alfalfa insects.

- Aldrin
- Emulsifiable Chlordane Concentrate
- Super Chlordane Concentrate
- Emulsifiable Toxaphene Concentrate
- Super Toxaphene Concentrate

Stock up on these, and other alfalfa insecticides now for maximum profit.

CATTLE SPRAYS AND DUSTS

Control of weight-reducing livestock and dairy pests is becoming a bigger problem every year for farmers and cattlemen. Show them how they can control these pests with the following Colorado .44 products:

- Gold Star Livestock and Barn Concentrate
- Stock and Barn Insect Killer
- Dairy Spray
- Grub Dust
- Ben Hex 12 Wettable Powder
- Sheep Dust
- Lindane
- Rotenone

HOUSEHOLD PRODUCTS

A complete household insecticide and weed killer line is available for stock. These heavily promoted items are profitable to handle, because they sell fast and really do the job. The Colorado .44 household line is as follows:

- Colorado .44 Bug Killer
- Colorado .44 Ant and Roach Killer
- Colorado .44 Garden Spray
- Colorado .44 Garden Duster
- Colorado .44 Rid-O-Weed
- Colorado .44 Chlordane Concentrate

WEED KILLERS

This line-up of highly effective Colorado .44 weed and brush killers, is a guaranteed sales producer. Made of the finest tested formulations, they really do the job—and produce the profit.

- Butyl Ester 2,4D 40%
- 2,4-D Weed Killer Liquid Amine Concentrate
- Super "80" Butyl Ester 2,4-D
- Aero Butyl Ester 2,4-D
- Isopropyl Ester 2,4-D
- Super "80" Isopropyl 2,4-D
- Brush Murder
- Hi-Strength Brush Murder
- 2,4,5-T Concentrate
- Butyl Ester Brush Killer

WHEAT AND SMALL GRAIN INSECTICIDES

This coming season promises an unusually dangerous invasion of wheat and small grain insects. Help the farmer prepare for these destructive pests, by having on hand an adequate supply of Colorado .44 small grain insecticides. The following Colorado .44 products provide high kill, lasting control of aphids, red spiders, thrips, and *green bugs* in wheat and small grain.

- Parathion 25% Wettable Powder
- Parathion Dust 1%
- Super Parathion Concentrate

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39 DEALERS IN 10 STATES

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Anhydrous Ammonia Applicator

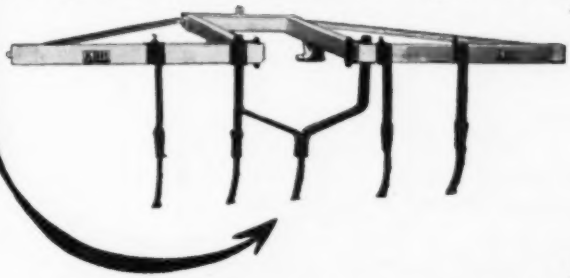
Patent Pending

You get positive penetration with Deepseal. Hydraulic ram and heavy-duty frame force applicator knives to any desired depth up to 12 inches. Double triangle knife tips scoop out underground chamber and seal ammonia in . . . High clearance of rig ideal for side-dressing.

Additional Territories Now Being Assigned To First Qualified Applicants—Don't Wait Till Fall

Here's a new product success story you'll want to hear. The KBH Deepseal anhydrous ammonia applicator was introduced last winter. Two years of tests had proved it to be the first applicator to insure positive penetration in any kind of soil. But other name makes had been on the market several years and were well established. Would Deepseal's advantages overcome this lead with dealers and farmers? Now, after four months of enthusiastic reception in both the Corn Belt and the Cotton South, we know for sure there's always a demand for a good new product that fills a real need.

Pasture Problems Solved by New Middle-Knife Attachment



Now five knives can be spaced as close as 17 inches apart for thorough pasture application and for pre-planting corn and small grain land. The new Middle Knife Attachment is easily mounted or removed with four large bolts. Other uses include side dressing in the middles and applying anhydrous ammonia in the middles preparatory to bedding out.

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Clarksdale, Mississippi

Builders of* EXTRA-STRENGTH *Farm Equipment

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Alcoa Cryolite
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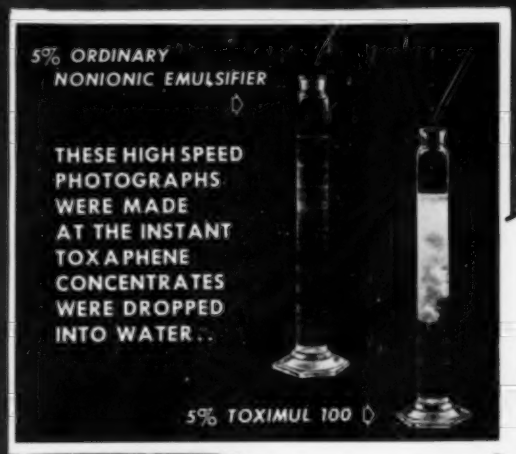

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SPONTANEOUS DISPERSION

use

NINOL TOXIMUL

a balanced anionic emulsifier for agricultural insecticides

TOXIMUL is the family name of Ninol Laboratories' new series of Emulsifiers, designed to improve performance and reduce costs of biocidal spray concentrates. Various members of the series have been developed for use with different types of insecticides such as Toxaphene, Chlordane, DDT, etc.

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Please send me sample and further information about TOXIMUL emulsifiers. Our major product type is:

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TITLE _____
COMPANY _____
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THE EDITOR COMMENTS

OVER twenty million tons of commercial fertilizer used during the year ended June 30, 1951! This is news which the industry has expected to hear, but it is still good to see the details in the annual U.S.D.A. consumption report published in this issue of *Agricultural Chemicals*. The largest consumption ever recorded, it represents an increase of 2,645,440 tons, or 14% more than was used in the previous 12 month period.

The fertilizer industry has reason to be proud of this achievement, for not only does it represent a thorough sales job, but also one of unparalleled production. Significant facts about grades, distribution and regional use are revealed in the comprehensive tables with the report.

There is yet another reason for happiness in the industry, aside from the big consumption report. And that, of course, is the recent report of the Delaney Committee which stated that no federal legislation in the chemical fertilizer field is necessary. It gives a clean bill to the industry and its products from a health standpoint, and should be a body blow to the cultists who have condemned commercial fertilizers so vociferously. Their claim that the use of chemical, "unnatural" fertilizers is ruining the nation's health has now been indicated as preposterous.

The Delaney Committee deserves a pat on the back for its decision to heed the testimony of impartial scientists rather than the hysterical claims of a few faddists. If equal weight is given to testimony of the experts on insecticides, another service will be done for agriculture, the chemical industry and the public.

A RATHER hectic and confusing scene greets the eye of anyone looking in on the current soil conditioner market. Numerous manufacturers have jumped on the bandwagon with all kinds of products, presenting a picture which bears an ominous similarity to the conditions surrounding the marketing of DDT when it was first okayed for public consumption.

We see advertisements in the Sunday garden sections of prominent newspapers as well as in gardening magazines and other publications urging the public to buy this article or that and reclaim run-down soil in garden and lawn.

Unless we are wrong, this is almost sure to result in a hasty and unscientific trial of a whole series of perhaps untested materials, with inevitable misapplication, misunderstanding of what the compounds are supposed to do, and perhaps dissatisfaction on the part of many users. A black eye given the soil conditioner idea at this point could well slow down normal progress so that years might be required to build up public confidence again.

As is true in many other phases of the agricultural chemical industry, it seems a good policy to "make haste slowly." New products should be introduced in an orderly manner to avoid the over-excitement, confusion and mistakes that are always the result of making haste hastily. We hope the soil conditioner situation hasn't already gotten out of hand.

JUST how the general price structure on insecticides is to be affected by the recent bids for export shipments of DDT through the United Nations, is a question that has the trade in a state of jitters. Most of the bids for sale of around a million pounds of DDT, both technical and 70% wettable, were substantially under the then current price of 45¢ a pound. Now the pesticide trade is keeping its fingers crossed lest the trend should spread to BHC and other insecticidal products.

Probably it is too early to make any predictions beyond out-and-out guesses, but it looks from here like this could be the beginning of a long-expected break in the market. Just how far it will go or how broad an area it will cover still remains to be seen.

Fertilizer Safety Can be Achieved

by

Jack Fields

Phillips Chemical Co., Bartlesville, Okla.
President, Fertilizer Section,
National Safety Council

GREAT dividends from both the humane and monetary standpoints may be accrued to the fertilizer industry through further development of the nation-wide campaign to increase the safety standards in plants. Each year, we realize more and more, how important is accident prevention to both business and private lives. And as we go along, it becomes increasingly evident, that accidents, like taxes, are inevitable unless management takes a firm stand against them. Management must realize that the causes of accidents and the causes of operating troubles are the same.

Accident prevention which embodies the control of each employee, the elimination of hazardous working conditions, unsafe construction and faulty methods of operation, is a matter of vital importance to the continued economic stability and harmonious employee relationship of any industrial organization.

By this time, it is assumed that most of the fertilizer industry is acquainted with the brief history of the safety movement. The idea of having a fertilizer safety section took form during 1950 and subsequent meetings of the small original group were held at Kansas City, Bartlesville, Oklahoma and Baltimore, Md. before the big general meeting in Chicago in October, 1951.

A sincere effort was being made to correct the situation in which no large-scale safety program was available for manufacturers of anhydrous ammonia, ammonium nitrate, nitrogen solutions, ammonium sulfate, sulfuric acid or phosphate. The mixed fertilizer industry was completely ignored, and in fact, its existence was completely unknown by many who thought that all fertilizer materials were supplied by farm animals or as by-products of packing plants!

Numerous additional meetings have been held since October, with enthusiastic interest being shown in different regions. It is significant to note that most of the founders of the fertilizer industry safety movement are associated with companies whose annual frequency rates for fire and accidents are far below the national average for their types of manufacture. Smaller companies are showing a gratifying interest in improving their safety records.

The road thus far has not been particularly easy, but the officers of the Fertilizer Safety Section have had much encouragement and help from members of the advisory committee; committee chairmen; the National Safety Council; the American Plant Food Council; the National Fertilizer Association; trade magazines; and insurance companies. While the growth of this new section has been phenomenal, we feel that the movement is only starting and that there is still a long road ahead.

For the past 20 years, the fertilizer industry has grown like "Topsy", which may be the reason why safety and fire prevention have

(*Turn to Page* 137)

Consumption of Commercial Fertilizers in the U. S., 1950-51

by

Walter Scholl & H. M. Wallace

Division of Fertilizer and Agricultural Lime
Bureau of Plant Industry, Soils and Agricultural Engineering
Agricultural Research Administration
U. S. Department of Agriculture
Beltsville, Maryland

THE total consumption of commercial fertilizers in the year ended June 30, 1951, amounted to 20,988,740 tons, containing 1,238,234 tons of nitrogen, 2,110,127 tons of available phosphoric oxide (total P_2O_5, 2,537,162 tons), and 1,379,794 tons of potash. This is the largest consumption ever recorded. It represents an increase of 2,645,440 tons of fertilizers or 14 percent more than the consumption of 18,343,300 tons reported in 1949-50[1]. Mixed fertilizers, 13,977,850 tons, constituted 66.6 percent of this total. The other 33.4 percent, used mainly for direct application, was composed of superphosphate, 1,773,279; phosphate rock and colloidal phosphate, 1,039,624; sodium nitrate, 683,800; ammonium nitrate, 638,176; and gypsum, 606,897 tons, with lesser quantities of more than 60 other materials. The weighted average nutrient content of commercial mixtures used in 1950-51 was 24.19 percent as compared with 23.24 percent in 1949-50.

The data herewith show the number of tons of fertilizer reported shipped by manufacturers for consumption in agriculture throughout the forty-eight States and the Territories. The amount of nutrients (N, P_2O_5, K_2O) contained in these commercial fertilizers was computed from the tonnages determined in this survey and analyses published by State Control Officials. The weighted average nutrient content of commercial mixtures was determined from the grades and tonnages reported for each State and the average overrun or underrun. Fertilizer manufacturers, State fertilizer control officials, and agronomists cooperated freely in providing information for this 12th annual survey.

Tonnage, By States

CONSUMPTION of all fertilizers, by States, regions, and classes, is given in Table 1. Although the

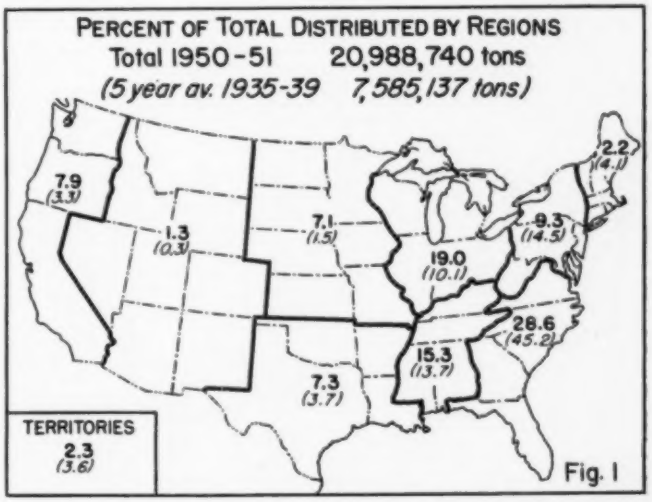

Fig. 1

TABLE 1

Consumption of Commercial Fertilizer Mixtures and Separate Materials

Year Ended June 30, 1951 1/

State & Region	Commercial Mixtures: July 1 - Dec. 31, 1950	Commercial Mixtures: Jan. 1 - June 30, 1951	Commercial Mixtures: 1950-51 Year Total	Separate Materials: July 1 - Dec. 31, 1950	Separate Materials: Jan. 1 - June 30, 1951	Separate Materials: 1950-51 Year Total	All Fertilizers: 1950-51 Grand Total	Relative Consumption 1949-50 = 100: All Fertilizers 2/	Relative Consumption 1949-50 = 100: Total N, Avail. P_2O_5, & K_2O
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent	Percent
Maine	18,887	137,108	152,853	9,018	7,000	12,018	164,840	77	78
New Hampshire	2,843	14,162	17,006	2,514	6,231	8,445	25,480	94	96
Vermont	2,940	22,473	25,413	9,106	21,308	30,412	62,030	120	98
Massachusetts	20,396	53,060	73,454	6,283	13,820	22,099	95,600	107	113
Rhode Island	1,647	12,000	14,028	977	2,384	3,631	17,718	90	95
Connecticut	2,138	49,720	58,245	9,318	24,399	33,710	96,063	94	98
New England	62,096	303,106	365,288	35,610	77,991	111,609	490,067	90	90
New York	65,911	389,880	445,081	46,484	113,886	154,338	625,933	100	100
New Jersey	47,125	180,483	230,858	8,174	16,000	26,071	257,079	100	111
Pennsylvania	147,375	371,425	516,798	32,846	75,780	106,585	618,383	99	102
Delaware	10,229	49,102	64,161	861	8,127	8,079	67,240	117	110
District of Columbia	384	1,130	1,474	287	482	719	2,105	110	98
Maryland	74,387	186,818	344,186	12,986	18,884	31,460	275,786	110	111
West Virginia	11,361	51,060	65,250	9,417	26,424	37,451	101,074	97	99
Middle Atlantic	378,422	1,187,079	1,557,081	113,844	269,150	369,302	1,926,383	103	106
Virginia	176,282	600,433	878,780	46,675	105,062	164,415	851,367	113	118
North Carolina	306,851	1,258,723	1,651,784	88,180	248,313	307,562	1,869,233	108	111
South Carolina	151,627	647,067	878,174	76,314	206,089	280,313	988,467	110	112
Georgia	140,490	892,260	1,034,088	85,083	190,840	275,066	1,311,964	111	117
Florida	346,740	971,532	917,272	36,113	48,977	85,088	1,002,380	114	120
South Atlantic	1,108,186	3,730,926	4,841,011	340,381	833,096	1,165,615	6,006,626	111	116
Ohio	316,881	608,700	900,897	18,080	48,011	46,071	951,708	108	118
Indiana	290,010	563,336	850,144	30,470	44,031	114,801	956,089	117	124
Illinois	186,708	313,149	457,875	413,290	330,740	720,083	1,175,858	119	168
Michigan	106,080	301,021	407,479	16,703	31,407	45,180	506,650	107	112
Wisconsin	76,980	321,083	398,048	15,080	27,018	41,487	630,150	107	116
East North Central	985,364	2,064,201	2,987,705	584,948	487,013	1,021,884	3,979,380	116	121
Minnesota	31,613	130,670	153,303	14,870	31,720	48,836	200,257	91	89
Iowa	60,401	138,207	240,344	62,969	101,180	143,690	388,030	118	132
Missouri	118,013	297,088	305,085	101,144	148,180	250,344	657,320	184	160
North Dakota	1,884	8,660	10,254	1,147	2,533	3,670	14,208	78	87
South Dakota	730	3,670	4,033	1,380	3,100	4,330	8,720	140	[illegible]
Nebraska	3,283	14,030	17,313	34,087	28,557	48,044	67,047	150	150
Kansas	30,080	16,472	70,864	71,076	43,410	113,086	186,680	116	123
West North Central	255,048	668,720	906,427	269,915	307,380	616,171	1,520,738	127	133
Kentucky	65,258	346,306	414,061	58,636	91,080	140,604	560,215	101	103
Tennessee	46,787	324,302	369,083	74,143	85,087	160,188	548,325	108	112
Alabama	137,423	691,840	825,080	200,738	270,280	473,581	1,300,060	114	117
Mississippi	35,186	297,147	330,156	243,001	210,270	452,383	782,734	114	117
East South Central	300,024	1,660,460	1,963,006	582,948	640,730	1,243,280	3,206,316	113	113
Arkansas	33,186	180,610	213,796	33,913	117,080	150,680	363,486	180	100
Louisiana	28,081	148,059	174,680	55,157	95,140	140,127	324,787	119	128
Oklahoma	16,313	61,180	68,518	40,403	30,081	70,680	146,198	109	100
Texas	68,013	217,141	285,186	122,040	130,033	317,480	603,630	120	113
West South Central	129,143	607,790	730,938	344,491	382,400	726,960	1,465,938	116	119
Montana	451	1,934	2,268	6,300	12,330	18,880	20,048	101	173
Idaho	415	7,015	7,428	11,754	38,127	38,838	47,331	94	86
Wyoming	108	685	793	1,475	4,075	5,551	6,314	111	104
Colorado	2,388	16,062	18,874	10,316	21,463	31,407	50,791	120	139
New Mexico	351	1,604	1,900	3,346	10,000	13,064	21,749	113	132
Arizona	5,168	22,064	27,062	31,218	46,278	78,318	106,180	190	280
Utah	212	2,118	2,330	16,083	18,300	26,385	29,015	160	176
Nevada	56	187	243	342	632	976	1,218	107	108
Mountain	10,209	51,142	61,348	81,616	137,080	210,330	280,079	143	143
Washington	4,903	24,317	29,232	23,090	33,227	57,016	88,247	108	121
Oregon	6,279	19,288	24,170	51,383	48,807	100,340	124,510	125	120
California	60,660	155,122	215,807	510,904	703,966	1,220,708	1,440,578	130	131
Pacific	80,475	182,730	270,214	590,943	782,170	1,388,123	1,660,337	128	129
Continental U. S.	3,216,575	10,435,580	13,660,400	3,000,080	3,397,836	6,687,514	20,307,980	113	118
Hawaii	23,438	38,174	48,612	37,030	38,827	72,941	122,486	110	100
Puerto Rico	142,418	141,307	288,720	38,298	34,020	70,124	365,868	141	140
Alaska	0	107	107	0	426	426	126	-	-
Territories	167,856	168,080	337,446	70,008	72,776	143,276	480,830	131	135
Total U. S., 1950-51	3,384,432	10,593,410	13,977,850	3,040,380	4,070,428	7,030,440	20,988,742 4/	116	118
1949-50 3/	2,448,830	9,848,036	12,297,596	2,051,050	3,704,086	6,040,704	18,348,300 5/	109	120
1948-49	3,216,751	9,002,705	12,800,000	2,307,275	3,300,100	5,708,373	18,041,300 6/	100	97

1/ Includes: ground phosphate rock, basic slag, minor element materials, such as boron, sulfur, manganese sulfate, etc. Used as separate materials, also fertilizers distributed by Government agencies. Does not include liming materials, but includes gypsum.
2/ Materials not guaranteed to contain N, P_2O_5 or K_2O excluded from these calculations.
3/ Revised.
4/ Includes 846,461 tons of minor and secondary element materials, principally gypsum, not guaranteed to contain N, P_2O_5 or K_2O.
5/ Includes 470,807 tons " " " " " " " " " " " " " " "
6/ Includes 800,000 tons " " " " " " " " " " " " " " "

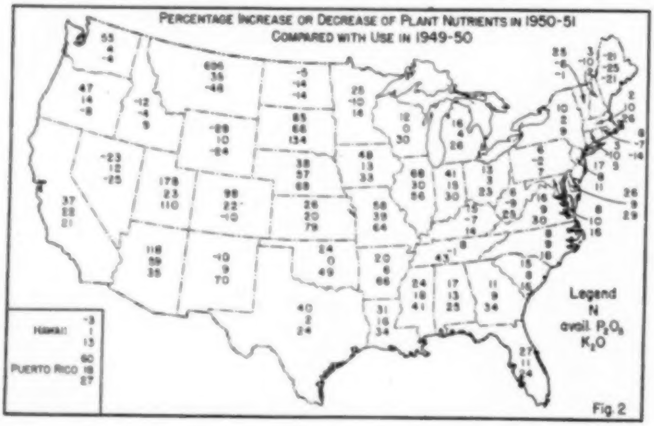

Fig. 2

United States as a whole used more fertilizer in 1950-51 than in 1949-50, a number of States used less; for example, the New England States, excepting Massachusetts and Vermont. The largest decrease (48,469 tons) for any State was in Maine. Consumption in Maine, therefore, was about the same as in 1940. Consumption increases of 100,000 tons or more were recorded in 10 States. The largest increases were 412,274 tons in California, 306,352 in Illinois, and 229,619 in Missouri. Six states, Alabama, California, Florida, Georgia, Illinois, and North Carolina used more than a million tons each. In 12 other States, more than one-half million tons was recorded. The distribution, by regions, is shown in Figure 1 as the percentage of the total consumed in 1950-51. For comparison, the average percentages in Agricultural Statistics for the years 1935 to 1939 are also shown (2).

Mixtures

THE 13,977,850 tons of mixed fertilizers consumed in the Continental U. S. and Territories in the year ended June 30, 1951, comprised 66.6 percent of the total fertilizer consumption, as compared with 67.0 percent (12,297,596 tons) in 1949-50. In the Continental U. S., there were 903 grades listed by their guaranteed analysis. Eighty-nine of these comprised 95.3 percent of the total quantity consumed. These 89 grades are listed in Table 2, with the quantities consumed in 1950-51 and 1949-50.

The 3-12-12 grade, leading all other grades in amount consumed (1,841,928 tons), comprised 13.5 percent of the total quantity of mixtures in the Continental U. S. Consumption of this grade in 1949-50 was 1,221,725 tons. Distribution is principally in the North Central region. The 5-10-5, 3-9-6, 3-12-6, and 4-10-6 grades were sold in next largest quantities in the order named. The total of these five grades was 4,943,153 tons or 36.2 percent of the total for all mixtures in the Continental U. S. in 1950-51. The 2-12-6 grade,

which was the leading grade from 1941 to 1949 and second highest in 1949-50, dropped to sixth place.

The 15 principal grades distributed in each region during the current fertilizer year are listed in Table 3, with their consumption in each of the respective States of the region. For most of the States, these 15 grades represent 80 percent or more of the total consumption in the State. A number of exceptions occur, however, particularly, in the West North Central, Mountain, and Pacific regions. Nevertheless, with the exception of Florida and Nevada, these grades represent more than 50 percent of the total consumption in the State.

The same 15 grades comprise the list as in 1949-50, except for one or two changes in each region. The 10-10-10 grade, for example, appears on the list for New England instead of the 4-12-4. The listing in order of consumption, however, is somewhat different. Grades moving up in the list were generally those with a higher analysis.

Of the mixed fertilizers sold in 1950-51, 12,521,867 tons, or 89.6 percent, were N-P-K mixtures. As may be seen from Table 6, the next most important group was the P-K mixtures which comprised 1,091,392 tons or 7.8 percent of all commercial mixtures: with the N-P-K mixtures they constitute 97.4 percent of the total. N-P mixtures and N-K mixtures, in this order, sold in the next largest tonnage. The order of consumption of these four classes remained the same as in 1949-50.

The weighted average nutrient content of commercial mixtures consumed in the United States increased from 23.24 percent in 1949-50 to 24.19 percent in 1950-51 (Table 4). This average, in 1950-51, comprised nitrogen 4.18, available P_2O_5 11.03, and K_2O 8.98 percent. The value of these nutrients respectively are 0.16, 0.10, and 0.69 higher than in 1949-50. Although the average nutrient content of mixtures selling in most of the States increased, there are exceptions, for example, Arizona, Oklahoma, New Mexico, and the New England

Mixed fertilizers comprise 66.6% of total consumption. Over 900 grades listed, with 3-12-12 leading all others in amount consumed. Higher analysis grades increasing.

States except Massachusetts and Connecticut.

The average nutrient contents, especially potash, have increased remarkably since 1935-39. The 5 year average nutrient contents of mixtures for 1935-39, as given in Agricultural Statistics (3), have changed in 1950-51 as follows: nitrogen 3.65 to 4.18, available P_2O_5 9.36 to 11.03, and K_2O 5.88 to 8.98 percent. The percentage increase of these nutrients was 14.5, 17.8, and 52.7, respectively. The average nutrient ratio changed from 1 -2.56-1.61 in 1935-39 to 1 -2.64-2.15 in 1950-51.

Materials

IN addition to mixed fertilizers, agriculture also used in 1950-51 7,010,890 tons of materials for direct application to the soil or for farm

TABLE 5

Consumption of Mixed Fertilizers in the Continental United States, Year Ended June 30, 1951 by Principal Grades, with Comparison for Year Ended June 30, 1950

Grade	Consumption Year Ended June 30, 1951	1950	Proportion of Total Year Ended June 30, 1951	1950	Grade	Consumption Year Ended June 30, 1951	1950	Proportion of Total Year Ended June 30, 1951	1950
	Tons	Tons	Percent	Percent		Tons	Tons	Percent	Percent
0-8-27	48,818	38,061	.37	.33	5-10-20	28,778	9,181	.21	.08
0-10-20	26,014	18,956	.19	.16	6-3-6	36,179	13,373	.27	.11
0-10-30	18,507	3,801	.14	.03	6-4-8	13,710	6,035	.10	.05
0-12-12	144,349	130,483	1.06	1.09	6-6-6	34,837	27,109	.26	.23
0-12-20	22,890	7,460	.17	.06	6-6-8	14,709	13,763	.11	.11
0-14-7	142,508	132,008	1.04	1.10	6-6-9	29,080	18,390	.21	.16
0-14-10	115,029	119,038	.85	1.00	6-8-4	180,785	537,405	1.31	4.55
0-14-14	234,770	118,782 1/	1.72	.99	6-8-6	262,951	287,083	1.93	2.40
0-20-10	60,331	85,790	.44	.71	6-8-8	218,834	169,788	1.60	1.40
0-20-20	217,162	116,580	1.59	.97	6-8-12	54,544	38,154	.40	.32
2-12-6	859,404	879,784	6.31	7.31	6-9-3	10,161	9,800	.08	.08
2-12-12	321,012	199,786	2.35	1.66	6-9-11	41,985	58,412	.31	.49
2-14-6	14,876	16,240	.11	.13	6-10-4	53,975	53,004	.40	.44
2-16-8	28,796	34,810	.21	.29	6-12-6	41,463	25,980	.30	.22
3-8-6	30,044	24,048	.22	.20	6-12-12	80,257	20,808	.58	.18
3-8-8	28,873	25,483	.20	.21	6-18-6	12,484	11,890	.09	.10
3-9-6	856,177	761,451	6.29	6.33	6-24-0	16,320	6,734	.12	.06
3-9-9	349,478	378,011	2.56	3.15	6-24-12	12,037	7,433	.09	.06
3-9-12	32,721	29,152	.24	.24	7-7-7	32,706	50,892	.24	.42
3-9-18	208,861	128,894	1.60	1.07	8-0-8	17,331	12,508	.13	.11
3-9-27	23,229	5,480	.17	.05	8-8-4	21,371	19,884	.16	.16
3-12-6	728,916	803,328	5.34	6.67	8-8-8	168,885	89,332	1.24	.74
3-12-12	1,841,885	1,221,728	13.50	10.16	8-10-12	13,086	10,080	.10	.08
3-18-9	118,013	154,839	.87	1.29	8-12-16	20,534	19,494	.15	.16
4-8-6	15,884	12,210	.12	.10	8-16-16	25,175	26,433	.19	.22
4-8-8	85,714	82,103	.63	.68	9-24-0	27,558	12,840	.20	.11
4-7-8	118,830	110,380	.87	.92	9-32-0	26,889	11,817	.20	.10
4-8-4	14,082	14,016	.10	.12	10-0-10	30,094	15,468	.22	.13
4-8-6	594,607	560,851	4.29	4.65	10-6-4	28,149	26,324	.21	.22
4-8-8	254,408	221,489	1.86	1.84	10-10-0	24,085	18,441	.18	.15
4-8-12	83,830	72,038	.61	.60	10-10-5	42,881	38,067	.31	.32
4-9-3	83,010	81,701	.61	.68	10-10-10	71,828	32,071	.53	.27
4-10-6	618,481	622,378	4.53	5.17	10-10-8	12,951	10,186	.09	.08
4-10-7	465,310	386,671	3.41	3.21	10-20-0	60,377	18,714	.44	.16
4-12-4	364,131	438,838	2.67	3.60	10-20-10	11,808	6,890	.09	.06
4-12-6	12,800	15,064	.09	.13	12-0-12	14,414	8,011	.11	.07
4-12-8	243,288	276,994	1.78	2.30	12-12-12	14,827	4,330	.11	.04
4-12-12	18,067	32,014	.14	.27	12-24-12	11,826	1,035	.09	.01
4-16-0	81,186	55,880	.59	.45	14-0-14	15,400	11,448	.11	.10
4-16-4	46,828	46,417	.34	.38	16-8-4	11,708	7,200	.09	.06
4-16-16	121,839	44,080	.89	.37	17-7-0	31,700	21,433	.23	.18
4-24-12	65,031	62,243	.48	.52	89 mixtures	12,990,838	11,475,035	95.50	95.32
5-8-20	22,854	17,880	.17	.15	Other specified grades 2/	554,184	448,438	4.08	4.14
5-7-5	20,166	19,689	.15	.17					
5-8-7	26,551	31,081	.19	.26					
5-10-5	837,875	878,377	6.15	7.28	Not segregated	59,714	64,890	.44	.54
5-10-10	569,816	446,761	4.19	3.71					
5-20-20	29,611	17,823	.22	.15	Total	13,605,836	12,028,038 1/	100.00	100.00

1/ Revised.
2/ There were 903 in 1950-51 and 810 in the 1949-50 season.

mixing. This is 965,186 tons more than used in 1949-50. The quantities of the various materials used are given in Tables 5 and 6.

The classes of materials consumed are in order of tonnage, phosphates, 3,490,350 tons (49.8 percent): chemical nitrogen materials, 2,304,500 tons (32.9 percent); minor and secondary element materials, 645,441 tons (9.2 percent); organics, 318,879 tons (4.5 percent); and potash materials, 251,720 (3.6 percent).

Net increases in consumption over 1949-50 were as follows: chemical nitrogen materials 518,596, minor and secondary element materials 205,934, phosphates 132,139, potash materials 82,821, and organics 25,696 tons. Chemical nitrogen materials showing the highest proportional in-

TABLE 8

Consumption of Mixed Fertilizers, By Grades, In Each State and Region, Year Ended June 30, 1951

State	Fifteen Principal Grades Consumed in the Region (Tons)															All Other Mixtures: Number 1/	All Other Mixtures: Tons	Total Tons
New England																		
Maine	[illegible]	[illegible]	[illegible] 2/	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Hampshire	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vermont	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Massachusetts	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rhode Island	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Connecticut	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Middle Atlantic																		
New York	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Jersey	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pennsylvania	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Delaware	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
District of Columbia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maryland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
West Virginia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South Atlantic																		
Virginia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
North Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Georgia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Florida	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
East North Central																		
Ohio	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Indiana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Illinois	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Michigan	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wisconsin	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
West North Central																		
Minnesota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iowa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Missouri	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
North Dakota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South Dakota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nebraska	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kansas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
East South Central																		
Kentucky	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tennessee	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alabama	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mississippi	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
West South Central																		
Arkansas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Louisiana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oklahoma	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Texas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mountain																		
Montana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Idaho	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wyoming	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Colorado	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Mexico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Arizona	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Utah	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nevada	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pacific																		
Washington	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oregon	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
California	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Territories 3/																		
Puerto Rico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

1/ The number of mixtures shown for each State and Region is exclusive of mixtures not specified by grade, although the tonnages of such mixtures are included in the totals.
2/ In the 1949-50 report this grade was reported to be [illegible] tons. It should have been [illegible] tons.
3/ All grades consumed in [illegible] are produced by one manufacturer to comply with specifications by consumers. In Alaska, grades consumed were [illegible]

creases were calcium nitrate, ammonium sulfate, and ammonium nitrate-limestone mixtures. The principal source of calcium nitrate was Norway: imports from June, 1950 to May, 1951 were 44,402 tons. Its use in California, as well as in a number of other States, appears to be growing. Consumption of ammonium sulfate and ammonium nitrate-limestone mixtures more than doubled in a number of States. Greater interest was shown in anhydrous ammonia for direct application. Its use was recorded in 23 States. This is 4 more than in 1949-50 and 13 more than in 1948-49. The large consumption of gypsum in California was the reason for the higher total use of the minor and secondary element materials.

The use of ammonium phosphate (16-20) increased in States west of the Mississippi, where this material is more generally consumed. The principal consumption of phosphate rock was in Illinois and Missouri. These two States consumed 74.2 percent of the total in 1950-51 and 70.5 percent in 1949-50. Most of the increase in use of basic slag was in Alabama. Distribution of superphosphate for direct application decreased 348,653 tons (16.4 percent) compared with 1949-50.

The direct application of 50 and 60 percent muriate of potash increased from 109,289 tons in 1949-50 to 189,838 tons in 1950-51. Such use for other potash materials was approximately the same as in 1949-50 except for manure salts and the sulfate. Consumption of manure salts decreased from 18,775 tons in 1949-50 to 8,440 tons in 1950-51, whereas sulfate increased from 13,902 to 18,703 tons in the respective years, reflecting the trend toward the use of more concentrated potash materials.

Nutrients

COMMERCIAL fertilizers contained 4,728,155 tons of nutrients in the year ended June 30, 1951. This consisted of 1,238,234 tons of nitrogen 2,110,127 tons of available phosphoric oxide (P_2O_5) (total phosphoric oxide was 2,537,162 tons), and 1,379,794 tons of potash (K_2O). These tonnages, by States, are given

TABLE 4

Weighted Average Plant-Nutrient Content of Commercial Mixtures Consumed in the United States, Year Ended June 30, 1951, and 1950 Total

State & Region	Year Ended June 30, 1951				Year Ended June 30, 1950
	Nitrogen	Available Phosphoric Oxide	Potash	Total	Total
	Percent	Percent	Percent	Percent	Percent
Maine	5.85	10.94	12.55	29.34	29.51
New Hampshire	3.51	13.28	13.01	29.80	30.71
Vermont	3.45	14.06	14.07	31.58	33.47
Massachusetts	4.83	10.44	10.75	26.02	24.41
Rhode Island	4.99	10.20	9.55	24.74	26.13
Connecticut	5.67	8.70	8.80	23.07	22.96
New England	5.21	10.85	11.61	27.67	27.91
New York	5.01	11.62	8.24	24.77	24.27
New Jersey	4.74	10.69	9.66	25.09	24.67
Pennsylvania	3.81	12.41	8.47	24.69	23.90
Delaware	3.79	10.81	9.50	24.10	23.69
District of Columbia	5.50	9.84	6.04	21.38	24.94
Maryland	3.58	11.53	8.18	23.29	22.89
West Virginia	2.99	13.18	8.75	24.92	23.44
Middle Atlantic	4.22	11.73	8.59	24.54	23.95
Virginia	2.95	11.16	8.63	22.74	21.75
North Carolina	3.50	9.93	7.85	21.28	20.90
South Carolina	3.75	9.94	7.15	20.84	20.76
Georgia	3.94	8.75	7.12	19.81	18.72
Florida	4.92	7.06	7.86	19.84	19.06
South Atlantic	3.82	9.31	7.71	20.84	20.19
Ohio	2.96	12.69	11.09	26.74	26.09
Indiana	2.94	12.73	12.70	28.37	26.77
Illinois	3.25	12.32	13.30	28.87	27.48
Michigan	2.65	13.66	11.80	27.81	26.71
Wisconsin	2.44	13.97	15.40	31.81	29.64
East North Central	2.89	12.95	12.46	28.30	26.68
Minnesota	3.36	19.08	14.13	36.53	35.17
Iowa	4.41	16.31	7.73	28.45	26.76
Missouri	4.13	14.21	9.02	27.36	25.27
North Dakota	3.92	29.23	9.97	43.12	36.25
South Dakota	6.88	16.38	1.62	26.88	23.57
Nebraska	9.24	21.85	1.29	32.18	30.92
Kansas	6.26	18.88	3.25	28.40	28.30
West North Central	4.36	16.34	8.91	29.61	28.18
Kentucky	3.54	10.98	7.88	22.40	22.40
Tennessee	3.75	10.06	8.52	22.12	20.96
Alabama	4.11	10.03	7.29	21.43	20.61
Mississippi	5.52	9.62	6.69	21.83	21.02
East South Central	4.16	10.17	7.52	21.85	21.07
Arkansas	5.04	10.10	11.04	26.18	24.82
Louisiana	5.84	10.70	7.23	23.47	22.39
Oklahoma	4.76	12.04	5.22	22.02	23.14
Texas	4.94	11.64	5.74	22.32	21.25
West South Central	5.09	11.01	7.58	23.68	22.73
Montana	9.54	21.15	1.02	31.71	31.04
Idaho	9.80	15.21	2.91	27.92	27.20
Wyoming	10.76	19.79	5.05	35.60	32.32
Colorado	9.64	20.31	5.45	35.40	34.07
New Mexico	8.23	11.08	2.06	21.37	25.39
Arizona	10.90	14.18	1.41	26.49	27.16
Utah	9.10	18.24	3.00	30.34	27.91
Nevada	7.88	14.22	3.73	26.13	24.92
Mountain	10.16	16.68	2.96	29.70	30.07
Washington	6.82	13.10	10.28	30.20	26.63
Oregon	8.03	16.12	6.80	31.95	30.65
California	10.26	10.29	5.36	25.91	25.47
Pacific	9.69	11.02	6.19	26.90	26.20
Continental U. S.	4.00	11.16	8.93	24.09	23.14
Hawaii	11.14	8.48	16.50	36.12	35.09
Puerto Rico	11.56	5.66	9.74	26.96	26.81
Alaska	9.47	17.39	10.58	37.44	---
Territories	11.49	6.11	10.81	28.41	28.08
U. S. Average: 1950-51	4.18	11.03	8.98	24.19	
1949-50	4.02	10.93	8.29	23.24	
1948-49	3.99	10.78	7.78	22.55	

in Table 7. The quantities contained in all fertilizers consumed in the United States for two earlier years is shown at the bottom of the same table. The 1950-51 figures for N, available P_2O_5, and K_2O are 23.2, 8.2, and 25.1 percent larger, respectively, than those for 1949-50; and 34.6, 8.7, and 28.6 percent larger than for 1948-49. In 1950-51, the total quantity of nutrients increased 16 percent whereas the quantity of fertilizers supplying these nutrients increased only 14 percent. This reflects the trend toward higher analysis fertilizers further evidenced by the increasing nutrient content of commercial mixtures as was seen in Table 4.

Although a larger consumption of nutrients was recorded for the United States in 1950-51, consumption in a number of States was less than for 1949-50. The percentage increase or decrease in nutrient consumption in 1950-51 compared with 1949-50, by States, is shown in Figure 2. Those States consuming less nitrogen used a total of 39,880 tons in 1949-50 and 35,866 tons in 1950-

TABLE 8

Principal Fertilizer Materials Consumed as such, by States and Regions, Year Ended June 30, 1951[1]

Tons

State & Region	Ammonium Nitrate	Ammonium Sulfate	Calcium Cyanamide	Sodium Nitrate	Other Chemical Nitrogen Materials	Dried Manures	Other Organics	Phosphate Rock[2]	Superphosphates 18-20 Percent	Superphosphates 30-40 Percent	Other Phosphates	Muriate of Potash 50 & 60%	Other Potash Materials	Minor and Secondary Elements	Total
Maine	1,382	248	206	299	72	788	187	18	9,265	2	210	188	6	84	12,018
New Hampshire	411	7	38	181	99	129	282	63	7,994	0	99	141	52	18	9,445
Vermont	317	462	18	134	80	72	24	308	28,730	0	148	442	0	29	30,612
Massachusetts	788	215	178	1,851	78	2,138	4,730	298	9,852	0	1,128	706	0	57	22,096
Rhode Island	28	189	18	165	32	319	254	80	1,617	0	148	80	3	8	2,531
Connecticut	414	252	84	1,344	149	958	14,914	516	8,979	54	1,848	1,782	2,222	788	33,710
New England	3,338	1,369	537	4,043	408	4,879	20,947	927	65,384	57	3,443	3,286	2,283	916	111,409
New York	6,575	638	1,077	6,806	611	2,974	5,862	1,416	187,280	68	936	643	49	307	184,308
New Jersey	1,535	329	2,336	3,181	320	2,618	1,602	773	9,676	6	1,982	1,200	214	133	25,071
Pennsylvania	1,673	1,464	1,673	2,112	232	3,814	4,790	2,542	84,145	60	1,836	648	41	1,976	106,966
Delaware	482	6	27	266	46	99	146	146	1,612	1	43	96	0	95	3,078
District of Columbia	1	0	0	98	0	204	233	0	62	8	98	1	0	22	719
Maryland	804	71	682	2,494	317	968	270	1,064	23,764	8	398	455	70	256	31,620
West Virginia	454	349	1	1,441	108	198	121	180	33,982	1,265	62	78	0	14	37,821
Middle Atlantic	10,925	2,868	5,806	16,369	1,636	10,870	13,314	6,919	309,090	1,396	5,149	3,039	373	2,802	389,208
Virginia	3,498	2,289	1,169	53,144	16,531	565	794	584	60,064	6,261	3,328	1,294	7,057	18,372	184,618
North Carolina	13,181	3,308	12,091	167,594	60,216	673	3,197	1,144	42,620	2,216	11,582	11,104	4,082	34,868	367,502
South Carolina	24,402	6,597	2,877	100,260	44,753	269	562	1,036	66,540	23	10,242	15,967	5,746	2,471	280,313
Georgia	15,143	1,743	1,280	94,118	19,181	908	747	1,100	74,983	1,176	30,190	14,008	3,713	17,726	275,096
Florida	3,606	2,043	2,234	19,236	8,367	1,023	8,368	7,299	16,494	86	6,230	4,332	12,876	3,081	86,060
South Atlantic	59,830	14,557	19,651	609,352	148,998	3,539	13,668	13,123	260,691	9,751	59,569	46,715	34,265	76,508	1,165,418
Ohio	6,282	6,435	3,148	1,446	913	1,641	8,782	6,890	27,484	1,916	1,007	871	191	78	66,071
Indiana	32,001	3,302	2,644	1,155	2,913	450	1,747	44,543	17,922	4,230	627	3,281	297	139	114,801
Illinois	24,026	9,127	941	592	7,473	5,829	6,510	601,219	44,593	4,680	2,834	32,004	1,101	27	732,056
Michigan	6,419	2,888	309	773	878	1,084	7,208	3,317	30,686	2,891	1,832	863	0	491	48,180
Wisconsin	8,011	477	5	2	109	868	5,298	22,286	3,860	216	444	3,904	289	342	45,897
East North Central	76,732	21,990	7,046	3,968	11,436	7,302	24,542	680,244	114,785	13,612	6,114	40,943	1,888	1,078	1,011,654
Minnesota	5,053	234	30	0	124	1,207	2,089	5,120	15,694	14,243	4,640	219	0	31	48,804
Iowa	21,010	2,961	826	0	2,610	44	1,222	30,265	69,175	5,050	9,675	2,219	0	36	143,692
Missouri	24,798	2,431	186	394	9,721	477	1,944	170,255	23,897	8,447	2,291	8,193	212	0	250,348
North Dakota	314	3	0	0	1	0	30	180	272	2,316	672	29	0	232	3,979
South Dakota	618	312	80	0	20	15	35	170	2,030	940	298	22	0	0	4,520
Nebraska	15,017	8,999	106	0	10,741	27	198	732	4,362	7,109	1,483	183	0	0	49,944
Kansas	23,274	6,062	65	1,131	561	216	827	19,097	12,302	44,101	9,754	119	0	0	116,096
West North Central	91,104	18,902	942	1,525	23,579	1,986	6,012	228,819	156,723	82,206	29,791	7,963	212	319	649,173
Kentucky	22,981	913	2,228	1,280	392	542	254	28,489	65,899	10,652	4,898	3,120	6,618	43	148,524
Tennessee	24,921	222	1,425	16,366	4,240	291	688	1,734	51,889	10,278	38,043	7,934	2,972	241	159,234
Alabama	40,966	4,879	2,554	113,063	8,982	418	224	1,694	80,669	659	201,767	10,368	2,004	1,333	470,981
Mississippi	93,408	48,690	5,740	62,878	46,079	29	88	4,827	27,952	866	118,543	28,241	336	10	462,399
East South Central	182,146	51,809	12,249	193,719	59,271	1,280	1,201	36,874	226,109	22,135	361,041	49,660	11,930	1,627	1,241,250
Arkansas	29,212	9,089	2,971	20,707	21,063	29	0	1,712	41,988	2,773	6,848	19,435	3,088	0	159,496
Louisiana	24,949	4,511	1,790	29,019	22,981	180	90	5,476	29,888	1,681	22,480	7,380	208	5	150,327
Oklahoma	4,907	489	50	12[3]	55	210	336	30,089	32,589	4,271	2,804	1,369	1	0	79,580
Texas	22,109	14,980	707	2,788	6,228	843	1,614	38,048	148,119	23,807	80,148	1,432	76	6,099	327,466
West South Central	80,777	29,009	5,598	51,616	50,331	1,332	2,040	76,323	252,126	32,811	89,967	29,756	3,370	6,104	726,869
Montana	2,580	3,099	0	0	180	0	102	40	40	10,362	1,851	5	0	651	18,560
Idaho	2,885	7,888	40	0	0	0	0	484	14,148	11,880	276	61	0	2,463	39,063
Wyoming	60	410	0	0	0	0	89	84	1,313	3,588	0	0	0	90	5,561
Colorado	5,080	5,070	6	32	2,802	92	879	0	3,418	12,780	1,548	162	68	436	31,807
New Mexico	1,180	1,412	0	0	1,478	35	180	80	2,266	6,480	6,216	110	0	802	19,854
Arizona	10,812	10,686	998	1,701	23,308	825	180	0	5,616	3,855	19,342	20	423	2,792	79,518
Utah	4,079	10,814	0	0	180	28	60	163	3,424	4,048	1,254	193	5	361	28,283
Nevada	0	4	0	0	0	0	15	40	40	496	1	0	0	271	876
Mountain	26,270	39,933	946	1,733	28,193	977	1,266	901	32,170	53,642	28,198	501	496	7,366	219,330
Washington	9,729	8,911	109	377	7,308	1,980	3,109	492	11,698	4,345	5,151	1,512	13	3,016	57,018
Oregon	14,644	30,272	518	101	4,785	317	696	360	23,231	4,108	14,713	1,515	93	4,801	100,960
California	70,524	135,668	7,196	833	116,142	160,000[3]	60,405	409	67,064	16,581	67,082	1,686	3,552	840,525	1,228,736
Pacific	93,897	174,851	7,823	1,491	128,322	162,077	64,210	1,261	102,911	25,034	86,952	4,595	3,658	848,542	1,506,127
Continental U. S.	654,797	363,104	64,206	893,716	449,322	193,442	135,549	1,057,991	1,533,088	230,204	666,994	182,848	58,423	945,360	6,967,514
Hawaii	3,289	43,299	0	78	2,150	8	80	1,633	888	1	2,446	6,578	3,377	91	72,845
Puerto Rico	0	68,078	18	8	2,180	0	0	0	154	17	1,967	687	92	0	70,124
Alaska	180	10	0	8	1	0	0	0	0	180	40	86	0	0	409
Territories	3,279	108,387	18	94	7,489	8	80	1,633	909	198	10,453	7,290	3,469	91	143,378
Total: 1950-51	658,176	461,491	64,222	893,800	456,811	193,450	135,629	1,059,624	1,533,977	230,402	677,447	189,838	61,892	945,441	7,010,892
1949-50	577,562	234,064	81,578	627,424	264,676	166,219	127,964	749,253	1,856,777	265,155	497,026	109,289	59,610	439,607	5,048,704
1948-49	547,223	220,041	69,998	700,048	231,220	134,661	123,744	742,700	1,784,719	196,280	472,548	95,108	60,604	509,585	5,708,379

1/ Includes distribution by Government agencies, materials for mixing on the farm, and gypsum. Excludes agricultural lime and materials used by manufacturers in the formulation of commercial mixtures. Consumption of each commodity is shown, by regions, in Table 6.
2/ Includes colloidal phosphate, the quantity of which is shown separately, by regions, in Table 6.
3/ Estimated.

TABLE 6

Commercial Fertilizers Distributed in the United States for Direct Use on the Land
Year Ended June 30, 1951[1]

Tons

Commodity	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Territories	Total
MIXTURES											
N-P-K grades	288,200	1,458,284	4,439,415	2,642,719	626,333	1,781,925	673,461	24,294	230,912	328,324	12,521,867
N-P grades	307	108	2,060	478	127,084	894	16,436	37,202	40,177	2,098	226,494
P-K grades	56,751	110,247	289,419	324,606	71,243	210,025	48,999	62	2,125	24	1,091,502
N-K grades	0	13	106,969	0	17	820	0	0	0	7,000	114,908
K grades[2]	0	429	23,180	0	0	0	0	0	0	0	23,589
CHEMICAL NITROGEN MATERIALS											
Ammonia - anhydrous	0	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	118,423
Ammonia - aqua	0	0	0	[3]	[3]	0	[3]	[3]	[3]	0	17,689
Ammonium nitrate	3,339	10,823	59,630	78,732	91,184	188,146	80,777	26,270	93,897	3,279	636,176
Ammonium nitrate-limestone mixtures	261	602	136,714	6,158	7,845	17,934	17,489	1,960	3,473	11	192,431
Ammonium sulfate	1,289	2,856	14,587	21,999	18,902	61,308	28,009	38,933	175,061	108,367	481,491
Calcium cyanamide	637	5,806	19,651	7,045	962	13,249	8,966	946	7,822	18	64,222
Calcium nitrate	18	0	5,963	1,697	100	6,632	626	4,299	35,426	39	54,689
Sodium nitrate	4,043	16,289	406,382	3,968	1,525	194,719	61,618	1,733	1,401	84	683,800
Other[4]	219	1,094	6,331	3,585	16,436	31,803	32,216	21,934	89,424	7,450	73,806[5]
ORGANICS											
Blood, dried	0	122	131	0	0	0	0	0	1,009	0	1,262
Castor pomace	5,543	11	2,233	0	0	0	0	0	832	0	8,619
Compost and muck	0	0	384	0	0	0	0	0	0	0	384
Cottonseed meal[6]	8,780	6	968	0	0	59	0	0	87	0	9,838
Fish scrap and meal	974	1	2	0	0	0	0	0	1,034	0	2,011
Hoof and horn meal	119	0	0	0	0	0	0	0	0	0	119
Linseed meal	1,095	0	0	0	0	0	0	0	0	0	1,095
Manures, dried	4,379	10,870	3,339	7,302	1,986	1,180	1,332	977	152,077	8	183,460
Peanut meal	70	0	39	0	0	0	0	0	0	0	109
Sewage sludge, activated	4,194	9,141	4,437	34,310	6,012	1,142	2,040	1,285	11,333	80	63,964
Sewage sludge, other	0	0	0	174	0	0	0	0	38,249	0	38,423
Soybean meal	775	0	20	0	0	0	0	0	0	0	795
Tankage, animal	4	558	80	0	0	0	0	0	140	0	782
Tankage, garbage	0	0	442	0	0	0	0	0	800	0	1,242
Tankage, process	1,403	3,183	2,814	88	0	0	0	0	893	0	8,081
Tung pomace	0	0	80	0	0	0	0	0	0	0	80
Other	0	292	0	0	0	0	0	0	543	0	835
PHOSPHATES											
Ammonium phosphate, 11-48	0	0	0	43	1,963	0	1,589	993	8,898	4,075	17,561
Ammonium phosphate, 16-20	0	0	0	1,232	14,553	328	60,757	20,466	66,022	4,453	167,811
Ammonium phosphate, 13-39	0	0	0	198	8,809	0	4,595	2,080	0	0	13,680
Ammoniated superphosphate	0	665	421	0	0	0	5,734	101	2,317	1,949	9,583
Basic lime phosphate	0	0	2,253	8	0	389	0	0	0	0	2,597
Basic slag	0	26	47,702	25	0	342,317	16,968	0	0	0	407,035
Bonemeal, raw	231	1,139	947	112	48	112	1,595	2	1,976	0	6,163
Bonemeal, steamed	2,610	3,119	238	1,468	142	189	99	1	87	0	7,892
Calcium metaphosphate	100	202	2,267	3,056	5,456	4,882	852	0	450	0	18,804
Fused tricalcium phosphate	0	0	5,561	0	0	12,189	0	0	0	0	17,750
Phosphoric acid	0	0	0	0	59	353	0	2,845	7,050	0	9,987
Phosphate rock	807	8,799	9,801	664,918	215,411	26,477	70,638	801	811	1,833	998,896
Colloidal phosphate	120	120	1,522	15,326	10,408	7,097	7,698	0	450	0	42,729
Precipitated bone	502	0	0	0	0	0	0	0	0	0	502
Superphosphate, 18%	12,647	43,873	143,085	38,193	16,415	85,165	83	20,818	24,519	0	384,070
" 19%	8,007	154	7,618	189	1,190	1,982	736	7,144	9,289	0	34,218
" 20%	48,950	268,863	109,988	76,402	109,117	199,132	284,337	4,208	69,003	809	1,156,809
" 32%	0	1	980	104	32	12	1,887	239	0	0	3,036
" 42%	0	0	0	0	18,685	0	0	38,002	4,724	0	61,411
" 43%	0	0	0	8	1,216	0	0	1,005	223	0	2,448
" 44%	0	0	0	0	0	0	0	40	0	0	40
" 45%	0	640	680	6,386	28,946	1,377	27,294	2,309	1,837	16	79,574
" 46%	3	656	0	2,494	12,279	1,833	690	4,118	291	0	23,072
" 47%	54	10	224	518	3,011	1,219	256	80	0	0	5,403
" 48%	0	60	5,588	2,440	13,279	11,366	690	849	17,879	182	52,232
" 49%	0	30	364	238	1,424	4,281	1,542	130	80	0	7,887
" 50%	0	0	818	1,428	3,434	2,317	476	0	0	0	8,610
Other (16% P_2O_5)	0	0	0	0	0	842	0	0	0	0	842
POTASH MATERIALS											
Carbonate	0	0	62	0	0	0	0	0	0	0	62
Cement flue dust	0	0	7,317	0	0	0	0	0	0	0	7,317
Cotton hull ash	1,451	1	0	0	0	23	0	0	0	0	1,477
Magnesia sulfate	103	36	2,166	825	148	1,224	928	0	0	666	6,093
Manure salts, 22-30%	0	16	4,716	822	66	457	2,363	0	0	0	8,440
Muriate, 80%	198	830	39,800	17,899	803	30,410	21,618	124	29	0	110,817
Muriate, 90%	5,068	2,409	7,215	23,344	7,450	16,284	7,168	427	4,664	7,290	79,221
Nitrate	383	0	6,754	0	0	12	9	0	0	0	7,158
Phosphate ash	0	0	1,979	0	0	1,979	0	0	0	0	3,957
Sodium nitrate	72	26	289	1	0	1,814	0	21	0	0	2,223
Sulfate	274	106	4,747	170	0	6,440	50	485	3,868	2,795	18,703
Tobacco stems	0	3	1,736	0	0	0	0	0	0	0	1,739
Wood ashes	0	0	4,411	0	0	0	0	0	0	0	4,411
Other	0	186	177	40	0	0	0	0	0	0	403
MINOR AND SECONDARY ELEMENT MATERIALS[7]											
Aluminum Sulfate	0	11	2	5	0	0	60	0	0	0	78
Borax	72	207	219	378	14	413	3	10	772	0	2,086
Copper sulfate	8	29	39	144	2	2	0	0	80	0	254
Iron sulfate	0	0	0	22	0	0	0	2	2	0	26
Land plaster (gypsum)	748	2,321	73,718	63	236	1,194	877	5,801	821,944	0	906,897
Lime sulfur solution	0	0	0	0	0	0	0	0	4,902	0	4,902
Magnesium sulfate	57	1	0	70	0	0	0	0	20	0	148
Manganese sulfate	18	42	84	232	68	0	0	4	10	0	462
Soil sulfur, 95-99+%	11	90	490	139	0	4	2,380	1,471	16,841	0	21,426
Sulfuric acid, 60-93%	0	0	0	0	0	0	4	0	2,014	0	2,018
Zinc sulfate	0	3	19	3	2	9	0	0	21	91	146
Minerals not segregated	9	96	1,944	31	0	5	2,780	87	2,054	0	7,006
TOTAL	484,667	1,956,283	6,004,426	5,979,359	1,800,798	5,206,314	1,463,859	280,879	1,669,357	480,820	20,986,760

1/ Includes distribution in the Territories and by Government agencies. Does not include materials for manufacture of commercial mixtures.

2/ Lime-potash mixtures. Cement flue dust shown under "Potash".

3/ Included with "Other".

4/ Ammonia, anhydrous and aqua; ammonium sulfate-nitrate; nitrogen solution, urea, and similar materials not segregated. Grand total averages 82% nitrogen.

5/ Includes above totals for ammonia, anhydrous, and aqua.

6/ Includes materials distributed by other than manufacturers of commercial fertilizers.

51, a decrease of only 4,014 tons. Similar comparisons for P_2O_5 and K_2O show decreases of only 22,760 and 6,225 tons, respectively.

Literature Cited

(1) Walter Scholl and H. M. Wallace, Agricultural Chemicals, Vol. 6 No. 6, 31-37 (1951); Commercial Fertilizers, Vol. 82, No. 6, 21-22, 24-25, 27-28, 30-32 (1951).

(2) U.S. Department of Agriculture, Agricultural Statistics 1947, Table 663, page 560.

(3) ———, Agricultural Statistics 1947, Table 661, Page 558.

TABLE 7

Consumption of Plant Nutrients, By States and Regions,
Year Ended June 30, 1951[1]

Tons

State & Region	In Mixtures					In All Fertilizers				
	Nitrogen	Phosphoric Oxide		Potash	Total N, Avail. P_2O_5, & K_2O	Nitrogen	Phosphoric Oxide		Potash	Total N, Avail. P_2O_5, & K_2O
		Available	Total				Available[2]	Total[3]		
Maine	8,951	16,725	17,395	19,200	44,876	9,632	18,389	19,089	19,339	47,340
New Hampshire	587	2,258	2,327	2,212	5,068	813	3,959	4,115	2,314	7,086
Vermont	1,119	4,559	4,712	4,560	10,238	1,363	10,488	10,951	4,836	16,687
Massachusetts	3,545	7,669	7,994	7,696	19,110	4,599	10,113	10,623	8,596	23,107
Rhode Island	709	1,449	1,534	1,356	3,514	879	1,808	1,911	1,396	4,083
Connecticut	3,079	4,806	5,112	4,861	12,748	4,633	7,221	7,692	6,846	19,700
New England	18,000	37,469	39,074	40,085	95,554	21,919	51,988	54,351	43,126	117,003
New York	22,155	80,975	83,177	38,477	109,607	28,241	83,448	87,319	36,956	146,643
New Jersey	11,025	24,869	26,107	22,682	58,356	13,017	27,134	28,524	23,195	63,346
Pennsylvania	19,787	64,367	66,818	43,951	128,076	21,887	82,478	86,306	44,406	148,770
Delaware	2,432	6,939	7,240	6,101	16,472	2,680	7,274	7,623	6,159	16,113
District of Columbia	81	148	148	89	316	118	192	196	97	407
Maryland	8,738	28,162	29,935	19,962	56,962	9,677	33,153	35,378	20,297	63,127
West Virginia	1,892	8,334	9,045	5,533	15,759	2,406	16,917	17,003	6,582	23,905
Middle Atlantic	66,080	183,791	192,468	134,575	384,446	78,026	249,594	262,351	136,691	462,311
Virginia	19,968	76,833	80,809	58,436	155,957	30,821	91,151	96,559	59,610	181,582
North Carolina	53,574	152,057	163,590	120,291	326,922	101,370	163,186	175,271	127,366	391,791
South Carolina	25,482	67,497	72,474	48,881	141,580	60,891	81,695	87,405	58,964	201,248
Georgia	40,819	90,622	98,851	73,779	208,219	86,990	109,071	117,983	81,938	287,999
Florida	45,176	64,736	78,467	72,078	181,988	53,643	68,795	84,809	77,862	200,180
South Atlantic	185,037	450,444	493,551	373,165	1,008,646	313,215	513,865	562,007	405,730	1,232,810
Ohio	26,253	112,348	120,273	98,178	236,779	31,128	119,384	130,091	98,768	249,250
Indiana	24,092	104,480	111,630	104,151	232,883	27,126	111,607	121,877	106,080	244,793
Illinois	14,219	53,984	57,578	58,256	126,441	27,289	84,047	261,684	77,243	188,579
Michigan	12,102	62,491	66,477	52,612	127,205	15,685	68,812	74,018	53,123	137,620
Wisconsin	9,958	51,198	54,417	56,449	116,806	12,047	53,042	62,530	54,861	123,780
East North Central	86,624	384,421	410,575	369,646	839,693	123,276	436,862	660,200	395,855	953,992
Minnesota	8,107	29,050	30,326	21,826	56,663	7,312	41,371	44,319	21,670	70,353
Iowa	10,884	39,532	41,886	18,724	68,942	20,302	89,723	70,836	20,019	100,044
Missouri	16,995	84,995	89,490	34,907	105,895	29,536	88,821	114,312	38,105	186,462
North Dakota	401	2,989	3,067	1,020	4,410	573	4,383	4,544	1,088	5,994
South Dakota	289	772	877	68	1,129	621	1,713	1,901	82	2,416
Nebraska	1,855	3,879	4,018	231	5,765	11,824	8,299	8,749	824	20,447
Kansas	4,419	13,392	14,178	2,294	20,104	14,798	39,171	46,952	2,372	86,341
West North Central	38,549	144,589	153,499	78,770	261,908	84,966	223,481	290,613	83,610	393,097
Kentucky	14,665	45,514	49,916	32,680	92,839	23,629	68,707	79,180	34,784	125,120
Tennessee	14,600	39,101	42,544	32,389	86,060	28,122	60,509	68,639	37,841	126,272
Alabama	34,036	85,156	89,709	60,446	177,639	69,127	121,703	152,698	68,966	257,786
Mississippi	18,243	31,762	34,215	22,102	72,107	96,368	58,830	61,302	35,149	187,047
East South Central	81,544	199,533	216,386	147,566	428,645	217,246	304,649	338,799	176,432	696,227
Arkansas	10,776	21,587	23,182	23,896	55,959	40,611	NA,852	36,093	33,961	107,404
Louisiana	9,871	18,861	19,961	12,619	40,950	38,319	28,226	32,468	16,649	83,194
Oklahoma	3,169	8,011	8,812	3,472	14,452	8,267	18,808	27,890	4,280	28,336
Texas	13,951	52,947	54,797	16,191	82,989	38,251	98,917	103,374	17,353	144,521
West South Central	37,567	81,106	86,752	56,177	174,550	122,448	188,783	198,785	72,223	363,454
Montana	216	479	530	23	718	2,018	5,328	5,732	26	7,372
Idaho	728	1,130	1,220	216	2,074	3,347	9,196	9,690	262	12,786
Wyoming	81	149	157	39	268	190	2,040	2,119	38	2,268
Colorado	1,830	3,853	3,998	1,055	6,718	6,760	11,080	11,329	1,189	18,969
New Mexico	166	210	220	39	405	2,357	5,188	5,302	104	7,649
Arizona	3,015	3,922	4,126	389	7,326	22,349	11,174	11,499	631	34,154
Utah	212	425	445	70	707	4,027	3,472	3,665	189	7,880
Nevada	19	35	37	9	63	20	250	275	9	279
Mountain	6,257	10,203	10,731	1,819	18,279	41,068	47,688	49,810	2,408	91,164
Washington	1,995	5,829	5,981	3,004	8,828	11,907	9,417	9,892	5,970	25,294
Oregon	1,942	5,854	5,819	2,128	7,726	17,885	13,540	14,185	5,107	33,932
California	22,545	22,625	24,043	11,780	56,950	142,063	66,270	69,202	16,170	226,503
Pacific	26,482	30,110	31,843	16,912	73,504	171,855	89,227	93,259	25,247	285,729
Continental U. S.	645,142	1,521,666	1,634,679	1,218,417	3,285,225	1,171,418	2,066,007	2,509,975	1,337,322	4,594,747
Hawaii	8,974	4,547	4,910	8,846	19,367	19,747	7,603	8,483	14,354	41,704
Puerto Rico	32,790	16,060	19,234	27,634	76,474	47,009	18,404	19,589	25,073	91,486
Alaska	10	19	19	11	40	60	113	115	45	218
Territories	38,774	20,616	23,163	36,491	95,881	66,816	26,120	27,187	42,472	133,408
Total: 1950-51	683,916	1,542,282	1,657,842	1,254,908	3,381,106	1,238,234	2,110,127	2,537,162	1,379,794	4,728,155
1949-50[4]	495,360	1,344,295	1,446,118	1,018,174	2,857,829	1,005,452	1,949,788	2,290,081	1,103,062	4,058,282
1948-49	612,474	1,384,669	1,500,030	999,035	2,896,178	919,946	1,941,709	2,289,631	1,073,073	3,934,728

1/ Includes Government distribution.
2/ Includes 2 percent of the colloidal phosphate and 2 percent of the phosphate rock marketed for direct application.
3/ Includes total phosphoric oxide in colloidal phosphate and phosphate rock marketed for direct application.
4/ Revised.

Absorption and Translocation of Insecticides by Plants[1]

by

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PLANTS may be subjected to treatment with insecticides in the control of phytophagous insects. As an active substrate, the plant may absorb and translocate these chemicals. This creates new problems for the entomologist, for when these insecticides are absorbed, their toxicity to insects, plants, and mammals may be greatly altered.

Mammalian toxicity of absorbed insecticides may create a greater problem than that indicated by specific chemical residue determinations, because of possible metabolism of the insecticide within the plant to form compounds of greater toxicity than the applied chemical itself. In addition, the translocated insecticide may cause off-flavor and unpleasant odors in the edible plant parts. Crop yields may be reduced if the insecticide is phytotoxic. Insecticidal toxicity may also be altered by plant absorption, since the penetration into the plant reduces available surface residues. This ability of plants to absorb and translocate certain chemicals has led to the development of systemic insecticides.

A brief consideration of the mechanism of plant absorption may clarify the later discussion on penetration of specific chemicals. Although not present on the roots, the aerial plant portions have as a protective barrier a cuticle somewhat similar to insect epicuticle. One principal difference between the insect and plant in their surface coatings is the sclerotized exocuticle of the insect, a type of protection not available to the plant. Plant cuticle may be highly lipoidal in nature, as in citrus fruits, a surface type which is conducive to direct penetration of certain insecticides. The cuticular barrier of the plant is interrupted by the natural openings such as stomata, lenticels, hydathodes, and by wound tissue which may serve as paths of entry by chemicals. Once inside the leaf or tissue, the material must penetrate the individual cells if a physiological reaction is to occur. The cell wall, composed primarily of cellulose and pectic materials, is readily penetrated. The plasma membrane, regulating factor in cell permeability, is partially lipoid in nature and is able to change its state of permeability in the presence of a great variety of substances and conditions. The penetration rate of non-electrolytes is generally correlated with the lipoid solubility of the substance, but compounds of smaller molecular size penetrate more rapidly than would be expected on the basis of their oil solubility alone (Collander 1937). This means that the rate of penetration will usually be greater with the undissociated form of the molecule and will increase with decreasing polarity of the groupings. The spatial arrangement of the groupings is also important in this respect. A certain degree of water solubility is often essential for most efficient contact of the material with the plant. Oil carriers or added surface-active agents may alter this necessary contact of the material with the plant cuticle and thus alter the penetration rate. In addition to these properties of the chemical, the dynamic processes of the plant itself become intimately involved in absorption and translocation. The type, age, and part of the plant, the amount of light, moisture, and carbon dioxide and the activity of certain enzyme systems are involved in these phenomena. The relations of insecticides and plants have been reviewed recently (Brown 1951) as have the recent advances on absorption and translocation in plants (Crafts 1951, Steinbach 1951).

The available information on the absorption and translocation of insecticides by plants can be divided arbitrarily according to the generalized usage of these chemicals. Before the synthetic organic insecticides, some of the older type materials, such as fumigants, oils, inorganics, and natural botanicals, will be discussed. For the sake of clarity, material will be generalized and summarized wherever possible.

Fumigants

FUMIGANTS enter directly through the stomata, although many are highly lipoid soluble. Increased fumigant penetration occurs under environmental conditions accentuating stomatal opening such as in sunlight and at high temperatures. Phytotoxicity is the principal hazard of fumigant penetration into

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the plant as evidenced by injury from hydrogen cyanide, hydrogen sulfide, sulfur dioxide and methyl bromide. Their rapid volatilization makes the health hazard of absorbed fumigants small, but a noticeable taint of foodstuffs may be produced as with carbon disulfide and ethylene dichloride.

Oils

THE mineral oils readily enter leaf stomata or penetrate the plant epidermis. When serving as insecticide-carriers they thus transport the dissolved materials into the plant. In the case of highly phytotoxic oils, an indiscriminate penetration occurs at the point of contact and there is negligible spread within the plant. Specialized plant structures may allow rapid penetration, such as occurs through the lipoidal citrus epidermis, or fruit lenticels, or via wound tissue. Oils are eventually transported to parenchymous areas where the phytotoxic materials present may act readily. The speed of penetration is inversely proportional to the viscosity of the oil, the more viscous oils moving so slowly that they may actually clog the vascular system and stop translocation. Pure oil applications penetrate more rapidly than oil emulsions. Salts of oleic or stearic acid may retard spray oil penetration. Little information is available on the entry of animal or vegetable oils into the plant. Absorbed oils in themselves do not constitute a serious health hazard. Impurities or insecticides dissolved in the oil may be very phytotoxic, since the carrier oil readily delivers the toxicant to a site of high plant metabolic activity. The penetration of the oil may be so great that surface residues of an insecticide dissolved therein may be inadequate for insect control.

Inorganics

SOLUBLE arsenic penetration into foliage has necessitated the use of insoluble arsenic compounds for plant treatment. Arsenic penetration occurs directly through the epidermis over the entire leaf surface, being most rapid in areas of thin or injured cuticle. Trees may be entered via bark wounds, dormant buds or lenticels. High arsenic concentrations may even destroy the protective power of the bark against entry. No direct absorption occurs through apple skin. Moisture, wetting agents and weathering enhance arsenic penetration by partially solubilizing it. To reduce soluble arsenic penetration into foliage, ferric oxide or better yet, zinc sulphate and lime mixtures, may be added as safeners. Absorbed arsenic from aerial applications is mainly deposited in the leaves, with only traces appearing in the fruit or seed or being translocated downwards to the roots. Lead arsenate is taken up from the soil in only trace amounts. No cases have been reported where enough arsenic was translocated from the soil to the edible portions to exceed the residue limits. The principal problem resulting from arsenic penetration is the high degree of resulting phytotoxicity. This plant damage may result from direct plasmolysis of the cells as well as from absorbed arsenic interference with normal plant metabolism. The penetration of fluorine compounds into plants and its significance generally parallels that of the arsenic compounds. It is the soluble fluorides that penetrate following hydrolysis of the insoluble compounds; lime has been used as a safener.

Selenium compounds are distinctive among the inorganic insecticides in their ability to be absorbed and translocated by plants. Sodium selenate absorbed by the roots of many plants serves as an effective systemic insecticide. Although the phytotoxic level is usually well below insecticidal concentrations, the mammalian toxicity and persistence of selenium in plants is so great that it cannot be used safely on plants grown for food.

Natural Botanicals

NATURAL botanical insecticides may be translocated readily within plants. Nicotine alkaloids found in the genus *Nicotiana* accumulate in the leaf material from which they are extracted commercially. Yet the site of nicotine synthesis is exclusively in the roots and the actively growing plant must translocate it upwards in the xylem. Nicotine synthesis by roots can be shown with the detection of excreted nicotine in aseptic cultures of isolated tobacco roots, and the synthesis and translocation can be demonstrated readily by reciprocal grafts of tobacco with non-nicotine-forming species. Thus nicotine-free tobacco plants result from tobacco shoots grafted to tomato stocks, and the reciprocal graft yields tomato plants of high nicotine content. With other plant insecticides, a translocation probably also occurs from the site of biological synthesis to the storage site. Although insoluble in water, the derris constituents may be absorbed and translocated from dusted foliage to untreated leaves in sufficient amounts to be somewhat insecticidal. No evidence is available for plant translocation of the pyrethrins present intracellularly in the achenes of *Chrysanthemum cinerariaefolium*. The translocation of these compounds in plants is of little significance in relation to their toxicity to insects, plants, or mammals but is of definite importance in their biological synthesis and storage.

Sodium fluoroacetate can be considered properly with the organic insecticides of botanical origin because of its natural occurrence in *Dichapetalum cymosum*. It is readily absorbed by the roots or leaves and is translocated up or down in amounts sufficient to make it a very effective systemic insecticide. Although its insecticidal toxicity is great at non-phytotoxic concentrations, the high mammalian toxicity of fluoracetate greatly limits its practical use as a systemic insecticide.

Synthetic Organics

SYNTHETIC organic insecticides can be subdivided into the chlorinated hydrocarbons and the organic phosphates. Such a subdivision overlooks many interesting compounds such as the dinitros and the fluorohydrins. Of the dinitrophenols, 3, 5-dinitro-o-cresol may penetrate the epidermis directly (more rapidly as the acid than as the salt) or may diffuse as a gas through the stomates, the principal hazard being the resulting phytotoxicity. Of the fluorohydrins,

bis (-fluoroethoxy) methane, bis (2-fluoroethyl) ether and bis (2-(2-fluoroethoxy) ethoxy) methane are readily absorbed from the soil and translocated in insecticidal amounts without harm to the plant, but their high mammalian toxicity limits their usefulness.

Chlorinated Hydrocarbons: DDT has received the most attention of the chlorinated hydrocarbon insecticides in respect to absorption and translocation by plants. It probably ranks behind only one other chlorinated hydrocarbon, the herbicide 2,-4-D, in the literature available on its penetration. There is no evidence available that DDT may be absorbed or translocated in more than trace amounts by vegetable plants under normal field conditions.

Citrus and other oily fruits, because of their highly lipoidal surface layers, may allow the DDT to enter the peel, but no toxicant is present in the pulp. Special plant adaptations may permit DDT penetration and produce rather interesting results. DDT in kerosene penetrates citrus fruits and foliage within a matter of minutes, but it then slowly creeps back to the surface where it is deposited. Since added aluminum stearate decreases oil penetration effectively, it also decreases the penetration of DDT dissolved in the carrier oil. With certain tropical foliage, the absorption of DDT in a carrier oil directly through the cuticle may be so great as to leave little surface residual material, and this absorbed material may be translocated both up and down in small amounts into the stem and roots. Artificial translocation in insecticidal concentrations may be achieved by applying DDT-lanolin pellets or by wicks carrying DDT suspensions. Damaged or disrupted tissue allows a site of ready entry. These examples discussed are special cases and it should be emphasized that DDT is not normally translocated into edible plant portions in large enough amounts to be of importance from a health aspect. Although there is available direct chemical evidence of DDT degradation within citrus fruits and cucumber plants, the nature and toxicity of these plant metabolic products is not known. Indications are available that the causative agent for stimulation of vegetable plants by DDT formulations must be absorbed and translocated. Further, it is likely that certain phytotoxic impurities, particularly 2-(p-chlorophenyl)-1, 1, 1-trichloroethanol, penetrate more rapidly than the intact DDT molecule.

Benzene hexachloride appears to be absorbed and translocated in plants in sufficient amounts to be a hazard. Off-flavors induced in edible portions following soil or foliage applications has been the main evidence for absorption of BHC by the plant, although insecticidal bioassay evidence also supports this hypothesis. BHC may be actually incorporated into the cell sap. This would be suspected from the induced polyploidy characteristic of its action on plants. The differential effect of the various BHC isomers in their toxicity to plants and insects and their ability to produce tainted food, makes a careful penetration study desirable on these isomers.

Of the other chlorinated hydocarbons, the phytotoxic effects of toxaphene and chlordane would indicate some penetration of the insecticide or its impurities, although supporting chemical analyses are not available. Chlordane may cause off-flavor of plant parts present in treated soil. Plants grown in aldrin-treated soils have no chemically detectable aldrin translocated into the edible portion. Preliminary evidence indicates a possible degradation of dieldrin within citrus fruits and leaves following penetration into the tissues. Little analytical data is available for other insecticides of this type. The very low water solubility of these compounds makes their translocation in large amounts improbable, but even traces may not be tolerated in edible portions.

Organic Phosphates: The organic phosphate insecticides vary greatly in stability, water solubility and ability to penetrate plants. Tetraethyl pyrophosphate, as a purified chemical or in hexaethyl tetraphosphate preparations, is absorbed rapidly into plant tissue as indicated by the appearance of growth inhibition or stimulation as well as formative responses and other metabolic disturbances. Because of their instability, the absorption of these phosphates is primarily of significance in their effect on plants. The suggestion that plant stimulation by absorbed phosphate insecticides is due to liberation of nutritional phosphorus by the plant, is improbable in view of the phytotoxicity of these materials.

Parathion has been noted to kill a variety of insects on aerial plant portions when applied to the soil. A fumigation effect has been offered to explain these results, but such an explanation is inadequate. Bioassay (mosquito larvae) and chemical determinations have now ascertained that parathion, or a structurally similar toxic material, is absorbed and translocated by plants. Chemical alteration of absorbed parathion has been noted for citrus fruits but the nature and toxicity of the products is not known at present. Absorbed parathion or its impurities may be very phytotoxic. Parathion and its oxygen analog, paraoxon, may be translocated up or down in plants in insecticidal amounts.

Systemic insecticides are chemicals absorbed and translocated by actively growing plants in sufficient amount to kill insects feeding at a site distant from the point of application. These insecticides have brought new importance to absorption studies. The principal phosphorus compounds included in this group are octamethylpyrophosphoramide ("OMPA"), diethyl ethylmercaptoethyl thiophosphate ("Systox"), triphosphoric acid penta (dimethylamide) and the bis (dimethylamino) and bis (monoisopropylamino) fluorophosphine oxides. A systemic insecticide must be absorbed readily through leaf and root cuticles from an aqueous medium, and must be sufficiently stable and toxic within the plant to provide prolonged protection against harmful insects. Although a high degree of water solubility is

(*Turn to Page* 135)

Dr. Eisenhower, Sen. Mundt, Dr. Coleman Speakers at June Convention of

National Fertilizer Ass'n.

WITH an outstanding roster of speakers listed on the program, the National Fertilizer Association was to hold its 27th June convention at the Greenbrier hotel, White Sulphur Springs, West Virginia, June 16-18. The speakers were to represent many phases of agriculture, business, education and government and were expected to bring to the convention the latest information on the general situation.

The opening day, Monday, June 16, was to begin at 9 a.m. with registration and a meeting of the

Appearing on NFA Program in June Convention

GEORGE V. TAYLOR

H. B. SIEMS

LEROY DONALD

NFA board of directors. Following this, the Association's Plant Food Research Committee is scheduled to hold an open meeting at which will be presented the newly-created subcommittee on Chemical Processing and Manufacturing.

Scheduled to appear on this program are George V. Taylor, Spencer Chemical Co., Kansas City, Mo.; Edwin C. Kapusta, NFA, Washington, D. C.; Richard E. Bennett, Farm Fertilizers; F. W. Darner, U. S. Phosphoric Products Div., Tennessee Corp.; Leroy Donald, Lion Oil Co., El Dorado, Ark.; R. M. Jones, Barrett Division, Allied Chemical & Dye Corp.; G. F. MacLeod, Sunland Industries, Inc., Fresno, Calif.; and H. B. Siems, Swift & Co., Chicago.

Tuesday's Session

HON. Karl E. Mundt, United States Senator from S. Dakota, was to speak on "Where to in '52?" at the 10 a.m. session Tuesday, June 17. John H. Stambaugh, assistant to the Secretary of Agriculture was to talk on "Agriculture — An American Business Opportunity" and J. E. Totman, president, Summers Fertilizer Co., Baltimore, Md., chairman of the NFA board of directors, was to present his annual convention address.

Ladies attending the convention were to participate in a bridge party Tuesday afternoon while the men were attending small group conferences, playing golf, tennis, or pitching horse shoes.

Highlight of the social season was scheduled for Tuesday evening, however, with four major features on the agenda. International Minerals & Chemical Corp. was to offer a refreshment hour from 6 p. m. to 7 o'clock, at which time the group was to assemble for the annual banquet. Entertainment at 9 was to be furnished by the nationally-known quartet, "The Skyliners" in a half hour of songs and musical novelties. Dancing in the ballroom is scheduled for 10 o'clock, with music by a Meyer Davis orchestra.

Dr. Eisenhower Speaks

WEDNESDAY'S session was to feature three speakers. Dr. Milton S. Eisenhower, president of Pennsylvania State College, State College, Pa., was to address the group on "Framework for Peace." He was to be followed by Allan B. Kline, president of the American Farm Bureau Federation, who was scheduled to talk on "Our Agriculture and America's Defense." Dr. Russell Coleman, president of the National Fertilizer Association, Washington, D. C., was scheduled to close the meeting with his annual presidential address before the group.

As customary at previous Greenbrier meetings, recreation and sports were expected to play an important part in the meeting activities. Wives of conventioneers were to lack nothing in the way of entertainment, with committees planning various activities. Mrs. J. E. Totman is chairman of the Ladies' Hospitality Committee; Mrs. E. M. Kolb, Ladies' Golf Committee and Mrs. J. A. Naftel, chairman of the Ladies' Bridge Committee have made arrangements for all the wives present.

Committees for various social and sports events for men are chairmanned by R. S. Rydell (men's golf events); A. A. Schultz, (horse shoe pitching contest); George Burns (tennis); and Gene Van Deren, (hospitality).

A complete report of the NFA convention is to appear in the July issue of *Agricultural Chemicals*.

ON OPPOSITE PAGE:

View of Greenbrier Hotel, site of National Fertilizer Association's twenty-seventh summer meeting.

Results of Field Tests on Use of Ryania Insecticides in

Corn Borer Control

by
Donald F. Starr and John T. Schulz
S. B. Penick & Co.
and Paul Ferguson
Fairmont Canning Co.

Part II

Discussion of Results

VARIOUS combinations of ryania and n-propyl isome were studied in both sprays and dusts. Ratios of ryania to n-propyl isome were 10 to 1, 15 to 1 and 30 to 1. In addition, combinations of ryania and sulfoxide were used at ratios of 10 to 1 and 30 to 1. After 2 years of testing, the 30 to 1 ratio of ryania to isome, in Ryanexcel 96-3 and Ryanexcel 15-0.5, seemed to be the most practical combination for both spray and dust. Higher quantities of isome added to the ryania would add to the cost of the formulation.

TABLE 1

Comparison of Insecticide Sprays for the Control of the European Corn Borer in 1950[a] and 1951[b]
Three and two applications of 35 gallons per acre

Insecticide	Pounds per acre	Percent Reduction of Borer Pop. 1950	1951	Percent Infestation of Ears Tip 1950	Tip 1951	Side 1950	Side 1951	Net Yield of Corn Tons per acre 1950	1951
Ryania, 100%	6[c]	86	81	20	22	8	4	2.99	3.11
Ryania, 100%	3	72	65	27	23	14	7	3.04	2.76
Ryanexcel 96-3	6	—	76	—	18	—	5	—	3.55
Ryanexcel 96-3	3	74	64	23	19	8	7	2.97	3.06
Ryanexcel 96-3	1.5	54	—	28	—	13	—	2.82	—
Ryanexcel	3	79	—	22	—	10	—	2.89	—
Ryanexcel 93-6	1.5	60	—	33	—	11	—	2.61	—
Ryanexcel 90-9	3	—	60	—	23	—	7	—	2.89
Ryanexcel 90-9	1.5	—	60	—	24	—	9	—	2.83
Ryania Sulf. 96-3	3	—	54	—	25	—	10	—	2.83
Ryania Sulf. 90-9	3	—	57	—	21	—	12	—	2.95
DDT Emul. 25%	6	97	55	13	15	4	8	2.97	2.22
Parathion WP 15%	3	74	86	21	15	8	6	3.33	3.14
Untreated	—	(430)[d]	(251)[d]	35	28	15	12	2.55	2.48
Difference required for signficance, 5%		14	15	6	6		6		0.43

Notes—
a—Three 8 day applications were made in 1950, first on June 29 and 30, second on July 7 and 8, and the third on July 15 and 16.
b—Two applications 6 days apart were made, first on July 17 and 18, and the second on July 23 and 24.
c—Fifty gallons per acre were applied in 1950.
d—The corn borer population per 100 plants is shown.

The use of sulfoxide in place of isome would also result in more costly insecticides without any improvement in the toxicity to corn borers. There was one exception. Ryania-sulfoxide 7.5-0.5 dust was effective in 1951 whereas ryania-isome 7.5-0.5 was not effective in 1950 and was dropped from the experimental program in 1951. Ryania-sulfoxide 15-0.5 was practically equal to ryania-sulfoxide 7.5-0.5.

The primary purposes of corn borer control are as follows:

1. Clean corn in the processing plant.
2. Increased yield of usable corn.

These results should be obtained without introducing undesirable insecticide residues on either the edible products or on the silage.

In these experiments, the yield data probably give a good indication of corn borer control. The yield data are not subject to the same sampling errors which are included in borer counts and the counts on the infested ears, since all the corn from the experimental plots was included in the results. The corn was picked by hand and inspection of the harvested plots insured as complete a collection of the corn as possible in a commercial operation.

The comparisons in the dust experiment were not as reliable as in the spray experiment because there were only two replicated plots instead of four. The yield data for the

dust experiment in 1950 are not shown, since the corn was picked both by hand and by machine. Reliable comparisons could not be made. In 1950, the spray experiment was harvested so that four plots of a given treatment were harvested and combined without regard for individual plots, but the difference required for significance should be only slightly higher than that indicated by the statistical analysis of the data for 1951.

Ryania formulations were outstanding in their effect on the yield. In 19 different comparisons, ryania insecticides showed increases in yield over the corresponding untreated plots. The increased yields ranged from 0.06 to 1.11 tons per acre, even though three of spray treatments involved only 1.5 lbs. per acre. Eight of the 19 increases were statistically significant and the largest increases amounted to 43 and 46 percent.

Good increases in yield were also obtained with parathion insecticides, but DDT was erratic. The one trial with 2% EPN showed corn borer control equal to 40% ryania, but there was only 0.13 ton increase in yield compared to 1.11 tons for 40% ryania. The yield data may also indicate insecticide injury to the corn. The application of concentrated emulsions of DDT will frequently cause some visible damage to the foliage. The poor results with DDT in 1951 may be a combination of poor control due to late insecticide applications and injury to the corn. There was only one comparison with EPN, but again the results could be explained if there were some slight injury to the corn.

A graphic comparison of some of the yields obtained with the insecticide sprays in 1951 is shown in Figure 1*. At the top of the bar graphs, shaded areas are included, which represent the difference required for significance. A glance at the graph shows that the yield obtained with 6 lbs. of Ryanexcel 96-3 per acre is significantly greater than all the other sprays with the exception of parathion, which was right on the border line of significance. DDT gave slightly less usable corn than the untreated but again a glance at the graph shows that the difference was not significant statistically.

In Figure 2**, the effect of varying amounts of ryania insecticides shown for both 1950 and 1951. Out of ten results only one, which is shown by the arrow, failed to give a reasonable fit to the line drawn representing the relationship between pounds of ryania and tons of usable corn. For every pound of ryania, in either dust or spray form, applied per acre, an additional 0.096 tons of usable corn was obtained. For every pound of ryania applied in combination with 1/30 of a pound of n-propyl isome per acre, an additional 0.183 tons of usable corn were obtained. On the basis of these figures, one pound of isome present in "Ryanexcel 96-3" or "Ryanexcel 15-0.5" dust is equal to 27 pounds of ryania. There is every indication that 3 lbs. of "Ryanexcel 96-3" applied per acre gives a signficant increase in yield, but that 6 lbs. gives double the increase obtained with 3 lbs. Presumably, this increase would level off as the control of corn borers approached perfection.

The results with ryania probably indicate the yields obtainable with complete lack of plant injury and good borer control. More work will be required to eliminate the remote possibility of plant stimulation or control of some pest other than European corn borer which was present but not observed.

In addition to the increase in yield, the ryania insecticides give cleaner corn in the plant than the untreated plots. More samples of ears, as they came into the plant, were needed to give a close comparison between insecticides as regards the reduction of the infestation of the ears. The reduction in side infestation was more pronounced than in-

(*Turn to Page* 135)

*See part I, May, 1952, page 60.

**See part I, May, 1952, page 73.

TABLE 2

Comparison of Insecticide Dusts for the Control of the European Corn Borer in 1950 and 1951

Insecticide	Pounds per acre	Percent Reduction of Borer Pop. 1950	Percent Reduction of Borer Pop. 1951	Percent Infestation of Ears Tip 1950	Percent Infestation of Ears Tip 1951	Percent Infestation of Ears Side 1950	Percent Infestation of Ears Side 1951	Net Yield of Corn Tons per acre 1950	Net Yield of Corn Tons per acre 1951
Airplane Application[a]									
Ryania, 40%	35	33	—	25	—	11	—	—	—
Ryania, 7.5%	35	10	—	25	—	15	—	—	—
Ryanexcel 15-0.5	40	39	45	17	26	8	8	—	2.63
Ryanexcel 7.5-0.5	35	11	—	35	—	20	—	—	—
DDT, 5%	40	6	35	20	21	7	12	—	2.32
Parathion, 2%	35	35	—	27	—	13	—	—	—
Ground Application[b]									
Ryania, 40%	26	94	77	6	18	8	4	—	3.48
Ryanexcel 15-0.5	30	—	60	—	19	—	8	—	3.19
Ryanexcel 7.5-0.5	35	-18	—	44	—	22	—	—	—
Ryania Sulf. 15-0.5	25	—	55	—	21	—	13	—	2.93
Ryania Sulf. 7.5-0.5	30	—	66	—	20	—	7	—	2.92
DDT, 5%	35	—	35	—	14	—	10	—	2.52
Parathion, 2%	25	—	45	—	21	—	6	—	2.81
EPN, 2%	30	—	77	—	15	—	5	—	2.50
Untreated	—	(395)[c]	(170)[c]	38	14	21	19	—	2.37
Difference required for significance, 5%	—	36	31						0.78

Notes

a—Three airplane applications were made in 1950, first June 20 to July 2, second July 11 and third, July 18. In 1951 only one application was made, July 19.

b—Two ground applications were made both years; in 1950, July 2 and July 13; in 1951, July 22 and July 27.

c—The actual borer population per 100 plants is shown.

Byrd, Truitt, Chapman, Sanders, Minor Keynote Seventh Annual Convention of

AMERICAN PLANT

FEATURING prominent members of the U. S. Senate and Congress on its seventh annual convention, the American Plant Food Council was to convene at the Homestead Hotel, Hot Springs, Va., June 19-22. Paul T. Truitt, president of the A.P.F.C. stated that an attendance of around 500 fertilizer manufacturers and leaders in the field of agriculture would be on hand.

The program was to begin on Thursday, June 19, at which time the group conducts a business meeting to name eight new members to the board of directors. Panel discussions, the annual banquet, reports of Council officials and other speakers will comprise the remainder of the program.

U. S. Senator Harry F. Byrd, Virginia, was scheduled to appear at the annual banquet on Saturday evening as one of the highlights of the convention. His subject had not been announced at press time.

President Paul T. Truitt was to present his annual address before the convention; Professor C. J. Chapman, Extension Specialist, Soils, University of Wisconsin, Madison, was to talk on "Pasture Improvement by Direct Fertilization"; and Dr. H. F. DeGraff, Cornell University, Ithaca, N.Y., was scheduled to discuss "Fertilizer's Relationship to the Food Economy."

Representative Harold D. Cooley, North Carolina, chairman of the House Committee on Agriculture, was to be the opening speaker Saturday morning, June 21.

D. Howard Doane
Appears on Saturday's Panel

O. V. Wells
B. A. E. Chief talks Saturday

W. A. Minor
Ass't. Secretary Final Speaker

FOOD COUNCIL

Paul T. Truitt
APFC President in Annual Address

P. D. Sanders
Moderator of Saturay's Panel

Panel Appears

FOLLOWING Rep. Cooley, the subject of "Major Factors Influencing the Future of Agriculture" was to be discussed by a panel of

C. J. Chapman
Discusses Pasture Improvement

experts. Dr. Paul D. Sanders, editor of the Southern Planter, Richmond, Va., and a widely-known authority on agriculture, was to be moderator. In addition to Dr. Sanders, the panel was to comprise the following:

Dr. Byron T. Shaw, administrator, Agricultural Research Administration, U. S. Department of Agriculture, Washington; O. V. Wells, chief of the Bureau of Agricultural Economics, U. S. Department of Agriculture, Washington; D. Howard Doane, founder of the Doane Agricultural Service of St. Louis, Missouri; and Herschel D. Newsom, Master of the National Grange, Washington, D. C.

W. A. Minor, assistant to the Secretary of Agriculture and chairman of the U. S. Department of Agriculture's Fertilizer Policy Committee was to be the final speaker on Saturday morning's program with a talk entitled, "We, Too, Have a Job to Do."

Plant Food Council committees responsible for making convention plans and their execution were as follows:

Executive and Convention Committee: George E. Petitt, Potash Company of America, Washington, D.C., chairman; C. Cecil Arledge, Virginia-Carolina Chemical Corp., Richmond, Va.; John V. Collis, Federal Chemical Co., Louisville, Ky.; C. B. Robertson, president, Robertson Chemical Corp., Norfolk, Va.; John E. Sanford, Armour Fertilizer Works, Atlanta, Ga.; and W. T. Wright, vice-president, F. S. Royster Guano Company, Norfolk, Va.

Golf Committee: Dean R. Gidney, U. S. Potash Company, New York, N. Y., chairman; Albert B. Baker, Jr., Bradley & Baker, New York, N. Y.; Robert B. Lenhart, G. L. F. Soil Building Service, Ithaca, N. Y.; and W. F. McLane, Lyons Fertilizer Company, Tampa, Fla.

Nominating Committee: Geo. E. Petitt, chairman; C. Cecil Arledge; Luis R. Gonzalez, Ochoa Fertilizer Corp., Hato Rey, Puerto Rico; W. Hampton Logan, Logan-Robinson Fertilizer Co., Charleston, S. C.; Ashmead F. Pringle, Jr., A. F. Pringle & Company, Charleston, S. C.; P. J. Prosser, The Baugh & Sons Company, Baltimore, Md.; John E. Sanford; and Frank S. Washburn, American Cyanamid Company, New York, N. Y.

Tennis Committee: A.J. Dickinson, Virginia-Carolina Chemical Corp., Richmond, Va., chairman; Benjamin H. Brewster, Jr., The Baugh & Sons Company, Baltimore, Md.; and William J. Rabel, American Cyanamid Company, New York, N. Y.

Regional Meetings Reveal Active Interest in

Fertilizer Safety

WIDESPREAD interest in the movement for greater safety in the fertilizer industry has been demonstrated in a number of regional meetings during the past weeks. Among these have been statewide meetings in Ashville, N. C.; Baltimore, Md., and Richmond, Va. All of these sessions were attended by local fertilizer manufacturers.

Officers of the fertilizer section of the National Safety Council were on hand at the regional meetings. These included Jack Fields, Phillips Chemical Co., Bartlesville, Okla., president of the national safety group; Vernon S. Gornto, Smith-Douglass Co., Norfolk, Va., secretary; A. B. Pettit, Davison Chemical Corp., Baltimore, Md.; and John Smith, Spencer Chemical Co., Kansas City, Mo., vice-president.

The Ashville Meeting, held May 6, was under the chairmanship of C. J. Watts, Jr., assistant manager of the Naco Fertilizer Co., Wilmington, N. C. who was elected chairman for next year's meeting scheduled to be held in May, 1953. (The place and day of the meeting were to be determined by the executive committee at a later date.)

Visual aid demonstration talks by Tom Clarke, personnel director, GLF Exchange, Ithaca, N. Y. and E. O. Burroughs, manager of the insurance department of F. S. Royster Guano Co., Norfolk, Va. were well received. Mr. Clarke's talk was of the audience-participation type wherein slide-film pictures were shown to illustrate incorrect and unsafe acts in fertilizer manufacturing plants. Individuals in the audience were invited to point out the unsafe acts as shown. If the question was answered correctly, the participant was awarded a cigar. If he failed to answer correctly, he received only a half cigar.

J. S. Fields, Phillips Chemical Co., Bartlesvile, Okla., president of the fertilizer section of the National Safety Council, addressed the group on "Fertilizer Safety on a Nation-Wide Basis", pointing out the necessity of widespread adherence to better safety rules from coast to coast. Insurance rates, based on the fire and accident records of the fertilizer industry, are far too high, he said. The only way to effect a reduction in this is to demonstrate to the insurance companies that the industry can and will become a better risk in the future.

R. E. Reitz, supervisory safety engineer, Glenn Falls Indemnity Co., Richmond, Va., outlined the procedure to be followed in organizing an accident prevention program in a fertilizer manufacturing plant.

V. S. Gornto opened the meeting by introducing distinguished guests present and then turned the remainder of the meeting over to Mr. Watts.

Panel at Baltimore

QUESTIONS and answers of a very practical nature were discussed at the Baltimore meeting on May 8. A panel under the chairmanship of Mr. Pettit discussed numerous phases of fertilizer safety. Appearing on the panel were Ralph Frazer, vice-president, Summers Fertilizer Co., Baltimore; T. M. Bloom, superintendent of superphosphate and mixed fertilizer plants, Curtis Bay Works of Davison Chemical Corp., Baltimore; George F. Dietz, safety director, Fertilizer Manufacturing Cooperative; and F. Wayne High, manager of operations, Baugh Chemical Co., Baltimore. Hugh Holt, Mathieson Chemical Co., Baltimore, was moderator in place of Walter W. Lehle, also of Mathieson, who was unable to be present.

The panel discussed and answered a number of questions which had been written and sent in before the meeting, and many in the audience of some 50 fertilizer men also participated in the general talks.

The first question asked for opinion on the best plan for training temporary employees hired during the rush season. Mr. Deitz, chosen to reply, conceded that such training in safety is difficult because of the lack of time. Some companies were reported to mix the new men among experienced workers so that the novices might learn proper procedure

Photo above: (L to R) Paul T. Truitt, president, American Plant Food Council, Washington; A. B. Pettit, Davison Chemical Corp., Baltimore, Md.; W. C. Richardson, Southern States Cooperative, Richmond, Va., chairman of Richmond meeting; Tom Clarke, GLF Exchange, Ithaca, N. Y.; Vernon S. Gornto, Smith-Douglass Co., Norfolk, Va., secretary of national organization; John E. Smith, Spencer Chemical Co., Kansas City, Mo., vice-president of national fertilizer safety section; and Dr. Ed. Kapusta, National Fertilizer Association, Washington, D. C. (Photo taken at Virginia state safety conference, May 16).

from the older hands. Temporary laborers usually comprise trucking and stowing gangs and pick wielders.

It was pointed out, however, that this practice of putting new men among older employees is not always fool-proof, since many of the more experienced workers have developed careless and dangerous habits which, if copied by persons unaccustomed to the job, might prove fatal or at least, injurious.

Time for training is badly needed, it was agreed, but in practice, such time is seldom available. Representatives of other firms stated that their new employees were broken in on outside jobs where danger is at a minimum, and as the workers show signs of competence and ability to work safely, they are gradually shifted into positions requiring greater caution.

Summing up the general discussion on the question, the group seemed to be agreed that safety among new employees must be the responsibility of management rather than depending upon other employees to instruct properly. "Safety must begin with supervision", one person observed.

"How can employees be persuaded to wear safety equipment?" was another question which brought about a barrage of replies. Almost as many suggestions were given as there were people present, but by and large, they boiled down to the idea of creating a desire on the part of the employee, to wear the goggles, masks, gloves and safety shoes provided by the companies. This is accomplished in one plant by showing employees pictures of accident victims, some of whom have received serious injuries by *not* observing safety rules, and of others whose eyes or hands have been saved by virtue of goggles or gloves, or who are still living because a respirator was worn under certain emergency conditions.

Other fertilizer manufacturers complained about the attitude of old employees who insist upon wearing pieces of cheese-cloth around their faces for protection from fumes and dust. Although these means of protection are known to be wholly inadequate, yet it is difficult to convince a man of this who has been doing it for 30 or 35 years, it was pointed out.

Some employees object to cleaning out respirator equipment, it was noted, and use this as an excuse not to wear the protective devices. To counter this, one company does the cleaning job for the men, presenting them a clean outfit which looks inviting to wear. This firm has no trouble in getting good cooperation in its safety efforts.

That management has a considerable responsibility in this regard was pointed out by several representatives who urged the foremen and "front office" men to set an example by wearing masks themselves when out in the plant.

A representative of a union, present in the audience, told how he and his fellow officers in the union urge the rank-and-file to cooperate in observance of all safety rules. "We say, 'Look, fellows, this safety equipment is here for your own protection. You're expected to use it all the time!' ", he reported. In addition, he and others act as constant "salesmen" for safety to keep their fellow workers aware of the benefits of safe habits.

It was brought out by others, that this type of promotion is most effective, since it comes from the workers' own ranks. Such a program, sponsored by management alone, however is often viewed with some degree of suspicion no matter how obvious the benefits are to the workers.

Dynamiting Safely

HOW to handle dynamite and work with it in bulk piles was the next question for consideration. Mr. Bloom warned that one must first be sure he knows the city, county and state regulations regarding purchase and use of dynamite before undertaking any kind of blasting activities. He must also be positive that he has the correct type of explosive for this kind of work. An expert should be consulted in all cases, since there is no margin of error in blasting.

Such an expert will take note of the type of building in which the bulk material is stored; the general surroundings and other factors which might be overlooked by the inexperienced person. It was agreed that blasting should not be undertaken unless absolutely necessary. The latest methods of multiple blasting were discussed, with warnings being sounded again about being sure of the correct procedure in this practice.

One fertilizer manufacturer complained that in several instances, dynamiting had blown out the lower part of a pile of material, leaving a "bridge" across the top which was difficult to knock down. Being too dangerous to allow employees to work on the top side of it, and too high to attack effectively from below, such a bridge presents a perplexing problem. The discussion which followed indicated that the technique of placing dynamite sticks must be faulty and that the situation might be corrected by having an explosives expert supervise the job.

Another potential source of trouble lies in "duds"; unexploded sticks of dynamite which remain in the loose material following an explosion. One company representative reported that following a recent blast, several sticks of explosives were scooped up in the fertilizer, but fortunately did not go off. Suggestions from others in the audience indicated that faulty wiring is probably the cause of failure.

Hazards arising from the use of car-pullers were aired by the group. The most widely-used type, the winch with a steel cable, is probably the most efficient, it was conceded, but is potentially the most dangerous in case of a broken cable. The whip and lash resulting from the snapping of a tightly-strung cable can cause fatal injuries to the operator unless he is protected by wire mesh cage or has other means of protection. It is important that the operator should know the limitations of his equipment so that it will not be strained to the breaking point in pulling too many loaded railway cars.

The comparative desirability of rope vs cable was discussed, with cables getting the nod from the standpoint of strength, but ropes are less dangerous in case of a break. Rope was also pointed out as being more susceptible to the corrosive effect of strong chemicals such as H_2SO_4, although steel cable is not immune to such attacks.

Machinery Maintenance

ONE of the liveliest discussions coming out of the safety conference was that surrounding safe procedures for cleaning conveyor belts and for dressing drive belts. Nearly everyone present had some unfortunate incident to relate in this connection. The first and last rule regarding this phase of manufacture, is *Don't ever work on any moving equipment*. To be positive that a workman is safe in cleaning or working around belts, the switch should be locked and a fuse taken out to avoid any possibility of the machinery being started.

Most of the accidents cited at the meeting were caused by workmen's attempts to reach into areas between moving parts to remove obstacles or to dress belts. Loose clothing which can catch on belts or pulleys was condemned as a particular hazard, but most of all, the careless acts of workmen around moving machinery. Prevention of such is the responsibility of management, the group reiterated, although it was regarded by some as strange that people should be compelled to work safely.

How to organize a safety program in fertilizer plants was the final subject for discussion at the Baltimore meeting. Mr. Bloom declared that the formation of a safety committee is practical even in small plants, since this keeps alive a consciousness of safety.

One system, in a larger plant, works through department heads who are responsible for safety records in their own areas. Top level management and leaders of workers' groups hold meetings and discuss safety. Suggestions from the employees are welcomed and many of their ideas are acted upon. All are acknowledged with thanks, and thus more ideas are encouraged.

In other factories, safety committees are sent on tours of the plant to report things they see and regard as being potentially dangerous. Since membership of such committees rotates, it presents an opportunity to gain a broad base of safety consciousness among all employees. In becoming alert to spotting hidden hazards, the men serving on safety committees themselves become staunch advocates of greater safety, it was pointed out.

Richmond Meeting

FURTHER discussions on fertilizer safety were held at Richmond, Va., May 16, in connection with the state safety meeting. W. C. Richardson, assistant manager, Southern States Cooperative, Richmond, was chairman of the all-day session which covered many phases of fertilizer plant operation and good manufacturing practices.

Following opening remarks by Mr. Richardson, John E. Smith, Spencer Chemical Co., Kansas City, vice-chairman of the fertilizer section, National Safety Council, talked on "Fertilizer Safety on a National Basis." He urged the industry to unite in a common effort to reduce accidents for the benefit of all concerned. Good housekeeping practices in the plant were brought out as the key to attracting a better class of workmen who will be less accident prone and who in turn will help set a safety pattern for newer employees.

He declared that the safety

(*Turn to Page* 129)

Facilities for Pesticide Research, Air Conditioned Rooms, Modern Testing Equipment to be in

New Hercules Laboratory

A NEW biological laboratory will be constructed by Hercules Powder Company at its experiment station near Wilmington, Del., the company has announced. The new structure will allow considerable expansion in the company's work in biological, botanical, and agricultural fields.

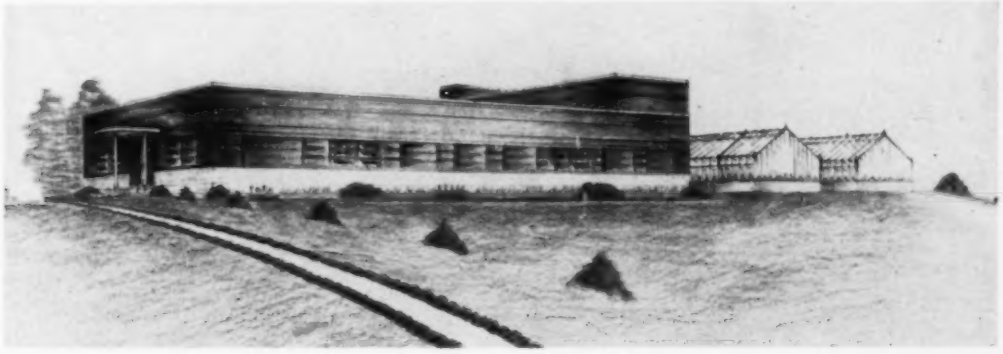
Plans for the new laboratory are being drafted now by the firm's engineering department. Construction will begin in September, and it is expected the laboratory will be ready for occupancy by April, 1953.

A main laboratory building and two greenhouses will comprise the project. The cost of the building is expected to be in the neighborhood of $400,000. Dr. E. N. Woodbury, chief entomologist, will head the work of the laboratory. Research carried on by the company at independent commercial laboratories and other agricultural experiment stations will be coordinated through the new central unit. A staff of approximately fifteen people will be employed.

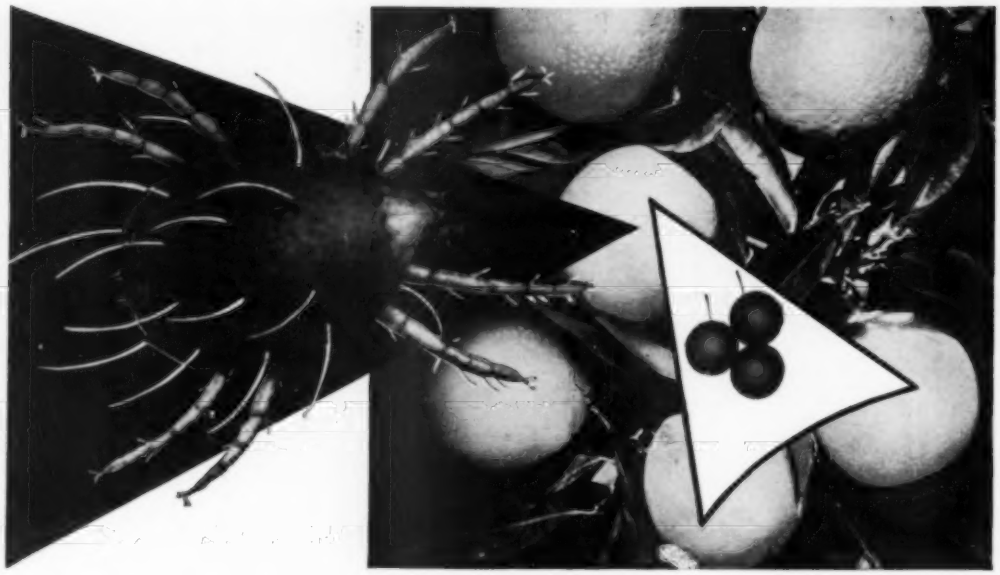
Hercules has done screening work on new agricultural chemicals since the late 1920's. Among the best known products derived from Hercules research into rosin and terpene chemistry has been toxaphene, base for widely used agricultural insecticides.

Applied research on insecticides, fungicides, herbicides, and defoliants will be carried on in the new building. Plant diseases, and seed and soil treatments will be studied also. The laboratory will be furnished with modern equipment; constant temperature and humidity rooms will provide uniform temperature and humidity for raising cultures of insects, fungi and bacteria; and test rooms, similarly controlled, will be used for applying experimental materials to determine their effectiveness against the cultures. Separate transfer rooms for the handling of specimens will be included. The building will be completely air-conditioned.

Greenhouses equipped with automatic controls will assure uniform conditions for growing a variety of plants with which to evaluate materials for their insecticidal, fungicidal, herbicidal, and defoliating properties.★★



Architect's drawing of new laboratory to be erected at Hercules' experiment station near Wilmington. Actual work is to start in September, with occupancy scheduled for April, 1953. A staff of about 15 persons will man the laboratory under Dr. E. N. Woodbury, chief entomologist.



Kolker Announces Full Commercial Production of K-101 for Mite Control

After two years work in pilot plant operation, Kolker swings to full production of K-101 (p-chlorophenyl p-chlorobenzene sulfonate) to meet heavier demand for this new and remarkably effective acaricide.

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K-101 is available to insecticide manufacturers interested in formulating emulsions and dusts. It is compatible with a large range of insecticide materials.

K-101 is effective against a long list of mites including European Red, Citrus Red, Atlantic, Pacific, Willamette, Six-spotted, Two-spotted, Brown Almond, and Clover mites.

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Clemson College Host to Over 200 at South Carolina

Fertilizer Conference

A TOUR of the experimental station and farm at Clemson Agricultural College, Clemson, S. C. highlighted the annual Fertilizer, Manufacturers - Dealers Conference held May 21-22 at Clemson House, Clemson, S.C. More than 200 fertilizer educators, scientists, manufacturers, salesmen, etc., from the Carolinas, Georgia and Alabama registered at the meeting. Dr. B. D. Cloaninger, head of the Clemson College Department of Fertilizer Inspection and Analysis, presided at the conference, which included reports by members of the Clemson faculty.

Special guests presented at a banquet session held May 21st, included Dr. Russell Coleman, president of the National Fertilizer Association, Dr. J. R. Taylor, agronomist of the American Plant Food Council; and Dr. H. B. Mann, president of the American Potash Institute. Dr. F. E. Bear, chairman of the Soils Dept., Rutgers Univ., New Brunswick, N.J., guest speaker at the banquet, spoke on "The Earth and the Fullness Thereof," in which he pointed out the necessity for replenishing the soil, and the effects of such deficiencies as boron and molybdenum in the soil.

During the technical session, Dr. A. B. Albert, associate plant pathologist discussed "Chemical Weed Con-

Front Row, (L. to R.): B. D. Cloaninger, head, Department Fertilizer Inspection & Analysis. Dr. H. P. Cooper, dean, school of Agriculture; director, Agricultural Experiment Station; J. B. Douthit, Jr., trustee, Clemson Agricultural College; Dr. Firman E. Bear, chairman, Soils Department, Rutgers University, New Brunswick, N. J.

Second Row (rear): Dr. J. R. Taylor, agronomist, American Plant Food Council, Inc.; Dr. Russell Coleman, president, The National Fertilizer Association; Dr. H. B. Mann, president, American Potash Institute; and Dr. R. F. Poole, president, Clemson Agricultural College.

Below: General view of audience at meeting.

trol", in which he pointed out that most chemicals are "specialists," and most effective on specific crops. The chlorates, ammates, TCA (sodium trichloracetate) have general killing power, he said, although TCA is also used selectively at times. He reported that TCA has been found particularly effective on grass, potassium cyanate has given good results on lawns and turfs, and the dinitros are recognized as general contact treatments, although they also show a selective action on certain crops.

The "Outlook of Insecticides for Use on Soils" was reviewed by Dr. M. D. Farrar, head of the Entomology Department, and state entomologist, who indicated that it is particularly important to know what crops on which to use certain insecticides. DDT has been found to remain in the soil permanently and is a slow acting chemical; BHC in small quantities has been found effective against wireworms and ants, but should not be used on certain crops, such as potatoes, because it causes an off-flavor; chlordane is not as stable as DDT or BHC, disappearing after one or two seasons, but has a specific effect on ants . . . it, also, has given some off-flavor in white potatoes; aldrin and dieldrin have not caused any off-flavor or stunting and will get more attention; further studies are also underway using parathion and toxaphene. It has been observed that in some cases, particularly in light sandy soils, chlordane and BHC have given some stunting of plant growth.

Studies currently underway to show the effects on crops of various insecticides when incorporated into soils at normal and high levels were illustrated by a tour through the soil plots at Clemson College, in which tomatoes, beans, corn and grass were planted in the following soils: 1) Davidson Clay Loam, 2) Cecil Sandy Loam, and 3) Norfolk Sandy Loam. Normal amounts of toxaphene, aldrin, dieldrin, chlordane, BHC and DDT were not harmful to the plants, but excess amounts of BHC, and in some cases DDT were found to have an adverse effect on plant growth.

The tour through various experimental plots at the experiment station was preceded by a group of brief reports on each of the projects, presented by various members of the Clemson faculty. Dr. W. A. King, dairy husbandman, described the work being done to reclaim abandoned cotton land for pasture use. The land containing a scattering of Bermuda grass was abandoned in 1946. It was limed and fertilized with basic slag and complete fertilizer, and then seeded with Louisiana giant white clover, and reseeded with crimson clover and perennial rye grass in 1949. In going through this pasture, it was evident that Bermuda and white clover have thickened to a good stand, and the rye and crimson clover are also contributing to the pasture.

Studies of various small grains, which were fertilized with 4-10-6 at seeding and later top dressed with 32 pounds of nitrogen, were reported by Dr. W. R. Haden, agronomist. Conference members visited the various fields, observing Anderson wheat, a high protein type grain, resistant to leaf rust but not stem rust; and Purcam wheat, which has yet to be improved before release as a certified wheat. Plots of oat varieties, wheat and barley varieties were also included in the tour.

Mulch tillage practices which have reduced runoff and erosion from corn land by about 75 per cent were reviewed by Dr. O. W. Beale, soil scientist. Fields illustrating the practice were observed in the tour. Mulch tillage employs conventional cultivating implements and is based on the destruction of cover crop plant, thus leaving a high percentage of the organic materials on the surface of the soil. According to Dr. Beale, mulch tillage has resulted in a one ton per acre increase of soil organic matter, and 70 pounds per acre of nitrogen each year. He indicated also that soil bacteria activity increases, and that soil crumb structure improves considerably. Plots at Clemson have been treated this year with 500 pounds per acre of 3-9-9 and will be side-dressed with 60-65 pounds of nitrogen at the last cultivation.

In a pre-emergence weed control program, several cotton plots were planted May 1st at Clemson, and these were visited by the conference group. Dr. W. B. Albert, plant physiologist discussed these fields and indicated the type chemical used, and dose of application. Chloro isopropyl phenyl carbamate (IPC) was found to be effective for most small seed weeds. Other compounds tested at various rates of application were: dinitro (at the rate of 4 and 6 lbs. per acre); chlordane (10 and20 lbs. per acre); Crag No. 2 (5 and 10 lbs. per acre); thalamic acid (U. S.Rubber Co. at rates of 4, 6, 9 and 12 lbs. per acre) and Esso-SO-38. Chlordane was found to have no effect in weed control, but this did not interfere with its insecticidal effectiveness.

The technique of applying pre-emergence chemicals was discussed by Dr. H. E. Bland, assistant agricultural engineer. In treating cotton plants, he indicated that the chemical should be applied in a 14-inch band over the planted seed, before the plant emerges. A second treatment, ten days after the plant has come up, may be applied to the roots and stems of the plant, but not on the leaf. About 35 days after emergence, hand or hoe cultivation may be resorted to.

Studies of water sources for irrigation, and irrigation of corn, forage, and peaches were reviewed by Dr. C. M. Lund, assistant agricultural engineer.

Work in the line of cattle farming was reported by Dr. E. G. Godbey, associate animal husbandman. The development of suitable summer and winter pastures is currently underway at the station. Preparation of both pastures includes an initial application of fertilizer, then extra nitrogen applications. Still two other projects under study by Dr. Godbey are 1) cross breeding, and 2) the comparison of pastures for beef cattle.

A research tobacco program reported by Dr. J. F. Bullock agronomist, Pee Dee Station, S. C., illustrated the close relation between the nicotine content of the tobacco and nitrogen applied to the soil. Dr. Bullock presented tabular data which indicated nicotine, sugar and chlorine varia-

Washington Report

THE Delaney Committee has issued the first of its series of reports to the House of Representatives on its recent investigations of the use of chemicals in foods and cosmetics.

This report, which dealt exclusively with fertilizers, will be followed in the near future by 4 or 5 other reports covering the committee's investigation into the use of chemicals in food products, cosmetics and pesticides. The next report, expected early in June, was to deal with cosmetics.

The keynote of the report, which was issued in mid-May, stated that it sees no need for Federal legislation in the chemical fertilizer field. It was pointed out that there are laws in every state regulating the sale of fertilizers and while the quality and quantity of food production are of national concern, no reliable evidence was presented to indicate that the use of chemical fertilizers presents a hazard. The report summarized that the specific type of fertilizer required in any particular area is a local problem and can best be regulated at the local level. It pointed out that witnesses expressed satisfaction with existing controls of fertilizers and stated that Federal legislation is not now necessary.

The survey on fertilizers was comparatively brief and numbered only 6 printed pages with about half of it devoted to a recital of the committee's history, its purpose, and a listing of many of the organizations that appeared during the hearings. The report did deal at some length with the controversy over organic vs. chemical fertilizers. Chemical fertilizers have been employed to some extent in the U. S. for over 100 years, but have been used most extensively since the period 1915-1920. At the present time, about 18 million tons annually are consumed but chemical fertilizers alone, it was shown on the basis of testimony, are not sufficient to maintain high productivity of soil. Most of the witnesses emphasize that the proper amount of organic matter content of a soil is a desirable and highly important factor contributing to the maintenance and improvement of high soil fertility.

* * *

The subcommittee also emphasized that there is evidence that "judicious supplementation with chemical fertilizers may result in crops whose yield and nutritional quality are equal to or better than crops grown in any other manner." Crops fertilized with the proper balance between organic and inorganic materials, when fed to animals, produce better health, superior animal output, higher grades of milk and wool, and better reproduction.

It recommended, however, that long term studies be made to determine "the relative effect of chemical and organic fertilizers upon the nutritive value of crops and the relationship of soils to human nutrition and health." It urged that extensive research be conducted to find practical methods for utilizing and conserving various wastes and other organic matter for fertilizer material. Testimony indicated that the use of farm manures can be increased by about 50% by improved collection, storage and distribution and that supplies of organic fertilizers can be considerably augmented by processing of garbage and other refuse.

The report estimated that of the 10,600,000 tons of nitrogen, phosphoric oxide and potash removed annually from the soil by the harvesting of food crops, only 3 million tons is returned by farm manures. About 18 million tons of chemical fertilizers are currently being used each year to make up the difference.

* * *

The recession in the consumer industries had its parallel in the agricultural pesticide field. Over-production, late season, heavy inventory carryover, slowness in the decision with regard to exports—all have contributed to the recessive conditions characteristic of the industry at this time. Uncertainties affecting other industries, such as the general recession in consumer demand, the steel problem, and what looks like a climactic phase in the Korean negotiations, have, of course, had their effect on the insecticide industry.

At press time, the price of technical DDT had fallen to a level of between 36c and 40c per pound, and BHC had also suffered a corresponding decline in price. Production of technical materials which has continued at a rather heavy pace since the end of last season has not helped. Continued high rate of plant operation, added to heavy inventories of finished and concentrated formulations, has added greatly to the over-supply and corresponding decline in price.

Every effort was being made in the latter part of May, by interested government agencies, to ease export controls considerably on DDT, BHC-containing dusts and sulfur-containing dusts for export.

Actually, all of the BHC formulations had been completely removed from control and it was considered likely that DDT would be placed on "open end" control for exports. This is usually the initial step towards complete removal from export controls.

Every effort was being made to liberalize the controls on sulfur-bearing insecticides and fungicides for export. However, this step was made rather difficult in view of the general shortage of sulfur.

As a whole, most industry members felt that unless there is a heavy and early infestation of insects this season, there will be further substantial price declines.

* * *

Members of the agricultural insecticide industry have lodged a protest with the various government agencies through the National Agricultural Chemicals Association against actions taken within the past year by the United Nations International Children's Emergency Fund to finance construction of plants abroad for the production of DDT to be used in the health programs of foreign governments. Although UNICEF financing is limited to purchasing of machinery and equipment and the major part of the cost is to be borne by the foreign governments, nevertheless, the American producers felt that the use of UN funds, the majority of which are provided by the U.S. Government, is wrong under these circumstances. The protest was based upon the premise that a program of government-owned plants is economically unsound, that

(Turn to Page 123)

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The Listening Post

Fungicidal Seed Treatments Reported

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

RESULTS of cooperative seed treatment tests on small grains have been summarized by R. W. Leukel, U. S. Department of Agriculture, Bureau of Plant Industry, Soils and Agricultural Engineering. In the spring and summer of 1951, 18 fungicides were tested for the control of bunt (*Tilletia* spp.) in wheat, and nine of these were tested also for the control of the smuts (*Ustilago* spp.) in oats and of stripe disease and covered smut (*Helminthosporium gramineum, Ustilago hordei*) in barley. Treated seed was planted and data on infection taken by cooperators in Idaho (Aberdeen), Illinois (Urbana), Indiana (La Fayette), Iowa (Ames), Minnesota (St. Paul), Montana (Bozeman), North Dakota (Fargo), Washington (Pullman), and Wisconsin (Madison).

The following fungicides were applied to portions of all four seed lots:

"Ceresan M": 7.7% ethyl mercury p-toluene sulfonanilide (3.2 % Hg). Applied both as a dust and as a slurry, it was used somewhat as a standard of comparison because it has been in common use for several years. It is made by E. I. Dupont de Nemours and Company, Wilmington, Delaware.

"Aagrano 350": 3½% ethoxy propyl mercury bromide (?% Hg). It is made in two forms, one for dust and one for slurry application. It will be marketed by Mathieson Chemical Corporation, Baltimore, Maryland.

"Agrox": 6.7% phenyl mercury urea (4% Hg). This is applied as a dust and marketed by Chipman Chemical Company, Boundbrook, New Jersey.

Table 1

Percentage of smutted heads grown from treated seed of smutty Ulka wheat in field plots at eight stations, 1951.

Treatment[a]		Rate per 500			Percent infection in plots planted at								Average percent infection
No.	Material	bu.	oz.	g.	cc	Urbana Ill.	Madison Wis.	Bozeman Mont.	Aberdeen Idaho	Pullman Wash.	Fargo N. Dak.	Beltsville Md.	St. Paul Minn.	
1:	Check	—	—	—		22.2	7.5	81.0	92.0	97	28.8	89.0	63.5	60.1
2:	Ceresan M	½	0.2	—		0.2	0.1	5.5	5.8	6	t	0.6	0.7	2.4
3:	Aagrano	"	0.2	—		3.0	0.1	7.3	6.1	16	0.5	8.5	2.3	5.5
4:	Agrox	"	"	—		11.0	0.4	16.8	21.8	54	1.5	0.8	4.4	13.8
5:	L-224	"	"	—		9.0	0.6	31.1	31.7	73	2.0	8.9	7.3	20.4
6:	Dynacide	"	"	—		9.0	0.4	21.3	33.1	62	5.4	1.7	13.3	18.2
7:	Leytosan	"	"	—		8.0	0.7	15.6	24.0	55	2.1	1.3	6.4	14.1
8:	K.F. 467	"	"	—		.5	0	1.9	2.6	2	t	0	0.4	0.9
9:	Mercuran A. S.	"	"	—		8.0	0.4	16.2	9.7	31	4.6	3.1	3.1	9.5
10:	Ceresan M slurry	"	—	3		.2	0	1.5	0	t	0	0.1	0	0.2
11:	Aagrano slurry	"	—	3		0	0	.4	0	0	0	0	0	t
12:	Panogen (Conc.)	¾	—	0.3		0.6	0	2.2	0.5	4	0	0	0	0.9
13:	Check	—	—	—		22.0	12.4	85.0	95.0	97	36.8	91.0	66.5	63.2
14:	Panogen (dilute)	¾	—	3		0	0	1.0	0	0	0	0	0.1	t
15:	Mercuran A.L.	½	—	3		0.3	0	.9	0.7	t	0	0	0.2	0.2
16:	Vancide 51	3	—	4		2.0	0.1	11.2	11.9	28	0.4	5.1	1.3	7.5
17:	Arasan	1	0.4	—		2.0	0	20.4	16.8	36	4.3	3.0	2.6	10.6
18:	Copper carbonate	2	0.8	—		1.0	0	7.0	—	10	0.6	0.6	0.6	2.5
19:	Phygon	1	0.4	—		1.0	0.1	2.0	12.1	12	0.8	0.1	2.2	3.8
20:	Spergon	1	0.4	—		.7	0	4.2	8.7	7	0.3	0.3	0.6	1.9
21:	C & C 640	1	0.4	—		.3	0	4.3	25.6	4	0.3	0.3	0.3	4.4
22:	C & C 5400	1	0.4	—		1.0	0.2	9.9	22.5	26	0.6	2.4	1.3	8.0
23:	Parsons' S.S. Dust	½	0.2	—		18.0	4.6	58.8	84.5	97	16.8	91.0	44.3	51.9
24:	Anticarie	½	0.2	—		5.0	0.1	9.0	2.4	11	7.0	1.6	3.6	5.0

[a]Treatments 10 and 11 were applied as slurries; 12 was applied as a concentrated "quick-wet" treatment; and 14 and 15 were applied like slurries except that the active ingredients were in solution instead of being in suspension. The remaining materials were applied as dusts.

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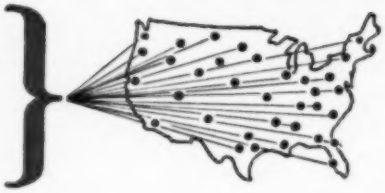

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"L-224": a zinc mercury chromate dust fungicide with the empirical formula $7ZnO \cdot 2HgO \cdot 2CrO_3 \cdot 7H_2O$. It is produced by Carbide and Carbon Chemicals Corporation, New York.

"Dynacide": 5% phenyl mercury ethylene diamine acetate (3% Hg). It was applied as a dust, but a wettable formulation is also available. It is produced by O. E. Linck Company, Clifton, New Jersey.

"Leytosan": 7.2% phenyl mercury urea (4.3% Hg). It was applied as a dust but may be used also as a slurry. It is a product of F. W. Berk & Company, London, England, and New York City. The material used was two years old.

"K. F. 467": 10% ethyl mercury perthio cyanate (?% Hg). This is an experimental dust that has been widely tested with generally favorable results. It is a product of the Koppers Company, Pittsburgh, Pennsylvania, but is not yet commercially available.

"Mercuran": methoxy ethyl mercuric acetate (3.5% Hg). It is made in two forms; one (A.S.) is applied as a dust, and the other (A.L.) is completely soluble in water and may be applied either as a "quick wet" treatment, or in more dilute form in a slurry treater. It is produced by Delmar Chemicals Ltd., Lachine, Quebec. The samples used were two years old

"Panogen": 2.1% methyl mercury dicyan diamide (1.4% Hg). This is a liquid treatment applied by the "quick wet" method, generally in a machine designed especially for that purpose. Experiments in 1951 indicate that it may be equally effective when diluted with nine parts of water and applied in a slurry treater. It is distributed by Panogen, Inc., New York.

The following nine materials were tested on Ulka wheat only:

"Vancide 51": 30% sodium salts of dimethyl dithio carbamic acid and 2-mercaptobenzothiazole. It is in liquid form and is a product of R. T. Vanderbilt Company, Inc., New York.

"Arasan": 50% thiram (tetramethylthiuram disulfide). It is a du Pont product and was applied as a dust. The wettable form, Arasan S. F. (70% thiram) was not used.

Copper carbonate: 50% metallic copper.

"Phygon": 50% dichloronaphthaquinone. This was applied as a dust. It is produced by the Naugatuck Division of U. S. Rubber Company. A slurry form of Phygon is also available.

"Spergon": 98% tetrachloro para benzo quinone. It was applied as a dust; it is also a U. S. Rubber Company product.

"C & C 640": a zinc copper chromate dust with the empirical formula $ZnO \cdot 4CuO \cdot CrO_3 \cdot xH_2O$.

"C & C 5400": a complex organic microfine dust, a reaction product of dimethyl dithio carbamate and sulfur dichloride. These two materials are products of Carbide and Carbon Chemicals Corporation, New York.

"Parsons' Seed Saver Dust": a complex quaternary ammonium compound (3.8% Hg) made by Parsons Chemical Works, Grand Ledge, Michigan.

"Anticarie": 20% hexachloro benzene. This is a dust bunticide produced originally in France and is marketed in the United States by H. P. Rossiger & Company, New York, and in Canada by French Dyestuffs Lt'd., Hamilton, Ontario.

Several materials, not generally considered as wheat seed treatments, were included in these tests, so that in case of a critical shortage of the better fungicides, fairly satisfactory substitutes could be recommended.

A 500 cc sample of seed was used for each fungicidal material tested. This sample, taken volumetrically, expedites the conversion of ounces-per-bushel to grams-per-sample. A 500 cc sample is approximately

Table 2

Occurrence of stripe disease in Atlas barley and its control by fungicides at three stations, 1951.

Treatment No.	Fungicide	Rate per bu.	500	cc	Percent infected plants from seed planted at Beltsville, Maryland March 6	March 29	April 16	Madison Wis.	Fargo N. Dak.	Percent average infection
		oz.	g.	cc						
1:	Check	—	—	—	27.0	25.0	5.0	1.8	1.5	12.1
2:	Ceresan M	½	0.2	—	0	0	0	0	0	0
3:	Aagrano	"	"	—	0	0	0	0	0	0
4:	Agrox	"	"	—	0	0	0	0	0	0
5:	C & C 224	"	"	—	0	0	0	0.5	0.5	0.2
6:	Dynacide	"	"	—	0.6	0	0	0	0.1	0.1
7:	Leytosan	"	"	—	0.6	0	0.6	0	0.2	0.3
8:	K. F. 467	"	"	—	0	0	0	0	0	0
9:	Mercuran A.S.	"	"	—	0	0	0	0	0	0
10:	Ceresan M slurry	"	"	3.0	0	0	0	0	0	0
11:	Aagrano slurry	"	"	3.0	0	0	0	0	t	t
12:	Panogen (concentrated)	¾	0.3	0.3	0	0	0	0	0	0
13:	Panogen (dilute)	¾	0.3	3.0	0	0	0	0	0	0
14:	Mercuran A.L.	½	0.2	3.0	0	0	0	0	0.9	0.2

Treatments 2 to 9 were applied as dusts; Numbers 10 and 11 were slurry treatments; 12 was a "quick wet" treatment with ¾ fluid ounce of concentrated liquid per bushel; in treatment 13 this amount was diluted with 9 parts water; in treatment 14, a solution of 10 grams in 150 cc was used and applied like a slurry.

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Table 3.

Control of loose and covered smuts in Canadian oats grown from naturally-infected seed treated as shown and sown in field plots at stations in ten States, 1951.

No.	Seed treatment[1] Material	Rate per 500 cc bu.	oz.	g.	cc	Percent infection in plots planted at Urbana Ill.	Madison Wis.	Bozeman Mont.	Aberdeen Idaho	Pullman Wash.	Fargo N. Dak.	Beltsville Md.	Blacksburg Va.	Ames Iowa	St. Paul Minn.	Average percent infection
1:	Check	—	—	—	—	32.0	29.6	11.9	22.5	22.0	23.6	26.9	18.3	9.6	19.2	21.5
2:	Ceresan M	½	0.2	—	—	0.3	0.1	0	0	0	0	0	0	.2	0	t
3:	Aagrano	"	"	—	—	0	0.1	0.1	0.1	0	t	0	0	.3	0.3	t
4:	Agrox	"	"	—	—	4.7	2.6	0.5	3.8	2.0	3.3	1.2	1.4	2.0	1.0	2.3
5:	L-224	"	"	—	—	19.3	24.7	7.5	20.0	12.0	14.7	9.0	14.7	6.3	8.2	13.6
6:	Dynacide	"	"	—	—	7.8	7.0	2.7	9.6	7.0	8.6	5.2	7.8	4.3	0.5	6.0
7:	Leytosan	"	"	—	—	7.3	7.0	2.8	7.0	6.0	10.0	2.5	7.4	7.3	2.0	5.9
8:	KF 467	"	"	—	—	5.5	5.2	3.0	4.7	2.0	5.3	4.9	6.9	6.2	2.0	4.6
9:	Mercuran A.S.	"	"	—	—	3.1	1.4	0.5	1.4	1.0	4.3	0.4	1.7	2.0	0	1.6
10:	Ceresan M (sl.)	"	—	3		0.1	0.1	0	0.1	0	0	0	0	0.2	0	t
11:	Aagrano (sl.)	"	—	3		0.1	0	0	0	0	0	0	0	0	0	t
12:	Panogen (conc.)	¾	—	0.3		0	0	0	0	0	0	0	0	0	1.0	0.1
13:	Panogen (dilute)	"	—	3		0.3	0	0	0	0	0	0	0.1	0	0	t
14:	Mercuran A.L.	½	—	3		3.7	9.6	3.1	10.0	7.0	15.9	6.2	8.1	3.8	5.5	7.3

[1]Treatments 2 to 9 were applied as dusts; 10 and 11 were slurry treatments; 12 was applied as a "quick wet treatment"; in Number 13 the same amount of Panogen was used diluted with 9 parts of water; in Number 14, 10 grams were dissolved in 150 cc. solution and 3 cc. added to sample.

1/70 of a bushel. If the rate of application of the fungicide is ½ ounce (14-17 grams) per bushel, a 500 cc sample will require 1/70 x 14.7 grams or 0.2 gram. Rates of 1, 2, 3, or 4 ounces per bushel are easily converted to 0.4, 0.8, 1.2, and 1.6 grams per 500 cc, respectively. This simplifies calculations involving bushel weights of different crop seeds, and also avoids the error involved in treating light chaffy seed as compared with heavy plump seed. On a weight basis the light seed needs more fungicide per bushel than does the heavy seed.

Five materials were applied in slurry or liquid form. "Ceresan M" and "Aagrano" slurries were prepared by mixing 10 grams of dust in 150 cc of water. By applying 3 cc of this suspension to 500 cc of seed, the required 0.2 gram of chemical was added to the sample, along with approximately 0.8% of water (by weight) to wheat, 1% to barley and 1.4% to oats.

"Panogen" was applied at ¾ ounce or 21 grams per bushel. This is equivalent to 0.3 gram or 0.3 cc per 500 cc sample when applied in concentrated form by the "quick wet" method. In the dilute form, 1 part of "Panogen" was diluted with 9 parts of water and 3 cc of this diluted mixture was applied to a 500 cc sample of seed.

"Mercuran A.L." was diluted by adding 10 cc to 150 cc of water and 3 cc of this solution was applied to a 500 cc sample of seed. The specific gravity of these materials (1.03 to 1.08) is not great enough to be an important factor in these calculations.

Seed of the Ulka wheat variety, inoculated with viable bunt spores at a 1 to 150 spore dosage, was treated February 16. The seed was stored in open glass containers in the laboratory until it was time to packet it for shipment to the eight field stations for planting. Germination tests were made in steamed soil two months and six months after treatment.

Stripe-infected Atlas barley was treated March 2, and germination tests in soil were made one week and again 22 weeks after treatment. Seed was sent to four stations for field planting.

Moore barley seed infected with covered smut was treated March 14, and germination tests of seed stored in sealed cans and in open cans were made three weeks and 19 weeks after treatment. Seed was sent to eight field stations for planting.

Smut-infected seed of the Canadian variety of oats was treated March 15, and germination tests were made of seed stored in sealed cans and in open cans one week and again 18 weeks after treatment. Seed was sent to 10 field stations.

Results with Wheat

NONE of the treatments had any appreciable effect upon germination in steamed soil two months and six months after treatment.

The heavy application of viable bunt spores to the seed of highly susceptible Ulka wheat resulted in extremely high percentages of infection at Aberdeen, Beltsville, Bozeman, Pullman, and St. Paul, and relatively poor control by many of the fungicides, especially at Pullman. The only fungicides that reduced the average of the infection percentages at all the stations to 1 percent or less, were "Aagrano" slurry, "Panogen" (diluted), "Ceresan M" slurry, "Mercuran A.L.," "Panogen" (concentrated), and "KF 467." It will be observed

(*Turn to Page* 127)


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Alfalfa Weevil Found in Eastern U. S.

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is connected with the department of Insect Pest Survey and Information, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

THE University of Maryland's Dept. of Agriculture recently announced that the alfalfa weevil had been found in that state. This weevil, considered one of the most important pests of alfalfa, has been in some of the western states for nearly 50 years. Until the find in Maryland, it was not known to be further east than Nebraska.

In addition to the original finds in Baltimore and Anne Arundel Counties, Maryland, further surveys have revealed the weevil's presence in Hartford, Howard, Carroll, Prince Georges, Kent, Talbot, Dorchester, Montgomery, and Wicomico Counties. Inspections are being continued. Shortly after the Maryland find, the weevil was discovered in northern Sussex County, Delaware, with rather wide distribution in the Greenwood area.

The alfalfa weevil is a silvery brown snout beetle, 3/16 of an inch in length. The eggs are deposited on debris, in the old stems of crowns and early growth. The footless green larvae, the most destructive stage of the insect, is about ¼ inch long and feeds on the tender foliage.

In the west, early cutting of hay is generally practiced to reduce the number of larvae[1] except when seed is to be produced. A heavy uniform healthy growth of alfalfa shades the ground and reduces the more favorable harboring spots for the weevil. The following chemical control recommendations by Utah State College and U.S.D.A. entomologists were taken from Utah State Agricultural College Extension Bulletin No. 220:

"Whether alfalfa is being grown for hay or seed, the best way to control the alfalfa weevil with an insecticide is to apply a spray containing 1.5 to 2 pounds of chlordane per acre when the spring growth is 1 to 2 inches tall. Usually the spraying will occur between March 15 and April 15. This treatment kills most of the adults before they lay many eggs and thus prevents the development of enough larvae to damage the crop later.

"When seed is grown, the additional weevil control needed is provided by the application of DDT for control of lygus. This application should be made before the plants are in the bud stage. The recommended dosages are 1.5 pounds of actual DDT per acre applied as a spray, or 2 pounds as a dust.

"When hay is raised, the grower may prefer to control the weevil by killing the larvae after they become abundant in later May or early June. If so, for maximum benefit, the treatment should be made when a considerable number of the plants have started to turn gray. Spray or dust with 2 pounds of calcium arsenate, 1 to 2 pounds of methoxychlor, or 0.2 to 0.25 pounds of parathion. *Leave parathion-treated hay at least 14 days before cutting;* otherwise, the crop may be cut in 7 to 10 days. *If parathion is used, it should be applied with power machines only and in strict observance of the directions and warnings of the manufacturer.*

"Do not feed the DDT-treated alfalfa to dairy animals, animals being fattened for slaughter, or to poultry."

An additional recommendation for spring adult control is dieldrin at the rate of ¼ pound per acre.

LISTENING POST SCRIPT

Since submitting the regular Listening Post copy for June, Mr. Dorward reports that infestations of armyworms have become more widespread. His latest report, dated June 4, states: "Armyworms which were reported as serious in some of the lower Ohio and Mississippi Valley states during the middle of May were being reported from Maryland, Delaware and New Jersey by the end of the month."

Cereal and Forage Insects

THE European corn borer winter mortality survey in Minnesota showed the average mortality in the southern 2/3 of that state to be 30 per cent as compared to 21 per cent in 1951 and 13 per cent in 1950. According to reports from Maryland, European corn borer moths were emerging in Wicomico County during early May with about 50 per cent of the overwintering larvae having pupated. Pupation was also well advanced in Carroll and Frederick Counties. Pupation ranged from 50 to 75 per cent in central and southern Delaware. In Ohio, no pupation had taken place by May 6 at Wooster, and only four per cent at Columbus by May 8.

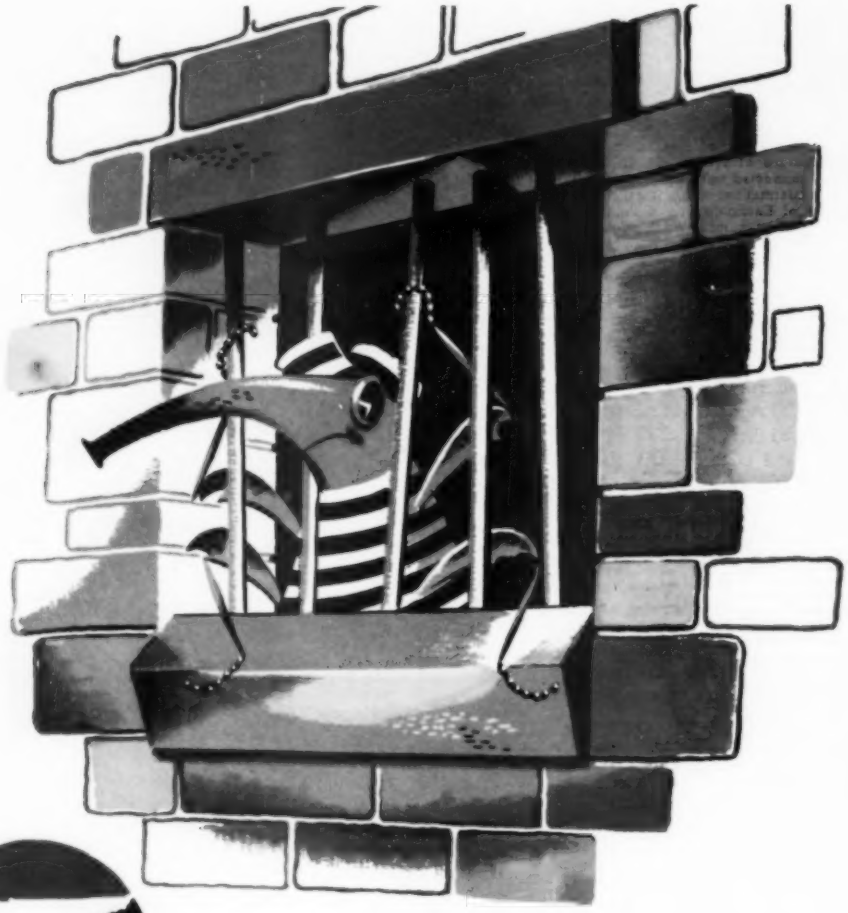
Pea aphids were abundant on alfalfa in various parts of the country during early May. This insect was severely damaging alfalfa in many localities in Kent and Sussex Counties, Delaware. Reports from Livingston County, N.Y., the Shreveport area of Louisiana, southwestern Ohio, Missouri, and many localities in Kansas also indicated high aphid populations. In parts of New Mexico and the Eastern Shore of Maryland, the pest was sufficiently abundant on alfalfa to require control.

Spittlebug infestations in Ohio had started in alfalfa and clover by the last week in April with spraying for control of the pest beginning in the central part of the state April 25. In Maryland, spittlebug hatching had started over most of the state by April 19 and hay crops were being sprayed. Nymphs were found on alfalfa and Ladino clover in Massachusetts in early May and on alfalfa and red clover in Oswego and Jefferson Counties, New York.

Fruit Insects

LARVAE of the red-banded leaf roller were seen May 7 for the first time this season in Cumberland

(*Turn to Page* 125)



COTTON ENEMY No. 1

Cotton was easy pickings for the Boll Weevil Bandit before BHC put this bad bug behind bars. Benzene Hexachloride* from Tennessee is the active chemical in many dust and spray formulations that have helped take Cotton Enemy No. 1 into custody.*

Widespread ravage of cottonfields is a thing of the past. But protecting our cotton crops from the Boll Weevil is just one of the many important contributions to everyday life made by chemicals from Tennessee... an industry serving all industry.

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Suppliers' Bulletins

New Defoliant Marketed

A new defoliant developed especially for the defoliation of cotton has been announced by Pacific Coast Borax Co., manufacturers of numerous "20 Mule Team" products. The defoliant is said to be effective in defoliating cotton from top to bottom and is being marketed throughout Arkansas, Arizona, California, Louisiana and Texas, in 100-lb. drums under the trade name of "PCB- Defoliant."

More than 3 years of intensive research and thorough testing under actual field conditions preceded marketing of the defoliant. It is a highly soluble dry material designed for spray application by either airplane or ground sprayers and is completely non-fire hazardous.

Cotton growers realize the advantages from the use of defoliants. For instance, defoliated cotton aids mature bolls in opening faster, prevents or reduces boll rot, retards fibre and seed deterioration through exposure to sun and the drying action of air movement. Control of boll weevil and pink boll worm is also said to be assisted by making possible the earlier destruction of stalks.

Further information may be had by writing to Pacific Coast Borax Co., Dep't. WD, 630 Shatto Place, Los Angeles 5, California.

•

New Nozzle Tip Announced

A new compact spray nozzle tip for use with portable sprayers, permits varying the spray from a solid stream to a finely atomized cone spray. Named the "Adjustable ConeJet Tip," it weighs only 1½ ounces, and fits the standard "TeeJet" spray nozzle body and the "Trigger TeeJet," made by spraying Systems Co.

It is designed for spraying insecticides, herbicides, and fungicides. Supplied in capacities, depending upon pressure, from one gallon per hour to 112 gallons per hour. Any setting to select spray desired is obtained by rotating the knurled body of the tip; only a half turn is needed

for full range selection from solid stream to finely atomized cone spray. For complete information write Spraying Systems Co., 3230 Randolph Street, Bellwood, Illinois. Ask for Bulletin No. 63.

•

Offers Power Sprayer

H. D. Hudson Manufacturing Co. has developed a new tractor power take-off sprayer featuring a positive piston pump. The latter, according to the makers, will maintain efficiency in pressure and output throughout long life with a minimum of servicing. This sprayer, (pictured below) features a quick-set pressure regulator, and an 8-way boom selector valve. The sprayer is equipped with a 20-ft. hinged boom with 13 ten-gallon-per-acre nozzles. it is designed for general weed and insect control spraying in fields and row crops.

Full information is available from the company, 589 E. Illinois St., Chicago 11, Ill.

•

New Century Sprayer

Century Engineering Corp. Cedar Rapids, Iowa, has developed a new power take-off mounted pump that will permit spraying as much as 160 gallons an acre according to an announcement by C. D. Davenport, sales manager. The new pump, No. 1540, will provide 20 gallons a minute at free flow and can operate under 300 lbs., according to the announcement.

•

New Pangborn Booklet

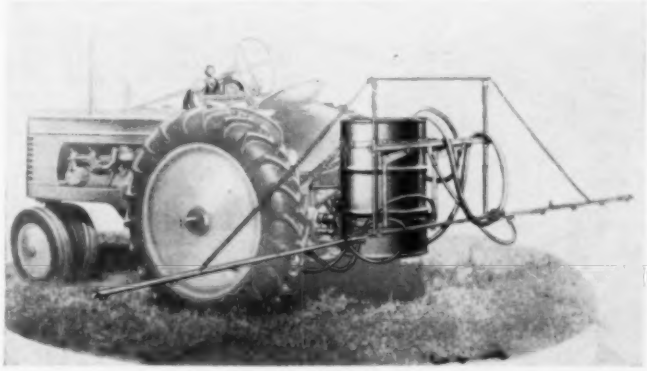
A new 28 page, two-color booklet, is being offered by the Pangborn Corp., Hagerstown, Md. Entitled "The Control of Industrial Dust," the booklet describes Pangborn dust control equipment and its applications. Copies of the booklets, Bulletin Number 909A, are available.

•

New Barenco Catalog

Barrington Engineering Corp., New York, N. Y., recently announced that a two color, four-page catalog describing Barenco mixers for the chemical, drug and other trades is

(*Turn to Page* 121)



Technical Briefs

Bait-sprays Show Promise

Baiting oriental and Mediterranean fruit flies rather than trying to control them with widespread insecticide spray programs, is a promising technique being developed by U. S. Department of Agriculture entomologists working to control this pest in Hawaii. Neither of these two flies have reached the mainland of the U. S. but mainland citrus growers are apprehensive in case the flies should be introduced.

BEPQ scientists find that applying a mixture of sugar, a new bait consisting of a protein compound of soy or yeast, and a quick-acting, residual insecticide, such as parathion, to limited areas of orchard foliage, provides good control of fruit flies for as long as two or three weeks. Fruit flies were attracted to bait-dipped guava tree foliage from distances of 50 feet or more.

In tests on semi-isolated wild guava growth, fruit fly larva numbers were reduced an average of 87 to 94 percent by bait-sprays applied with a mist blower at intervals of three weeks, while over-all applications of a conventional dilute DDT spray reduced infestations 82 percent. Only 3 to 4 ounces of actual parathion were required for treating an acre with the bait-spray. One and one-half pounds of actual DDT, in large volumes of water, were needed to completely treat an acre with the residual insecticide. Cost of the bait-spray was less than $1 a week for each acre protected.

The fact that good control was achieved with only small amounts of actual insecticide, led entomologists to believe that bait-spraying may prove especially valuable for large scale fruit fly control operations. Thus complete coverage is much less essential when bait-sprays are used, because the fruit flies can be counted on to seek out the spray.

Further research may determine if fruit flies can be controlled by applying the bait-spray to only non-fruiting areas of the host plant. If such proves possible the parasites of the fruit flies will have greater chance of surviving insecticide applications. In limited studies, it was found that infesting of fruit fly larvae with parasites in plantings sprayed with DDT averaged only 42 percent as compared with 76 percent where the bait-spray was used, and 62 percent in untreated areas.

—BEPQ Bulletin, May 9, 1952

•

Virus Attacks Leaf Rollers

The Virginia Agricultural Experiment Station recently announced a virus disease that attacks leaf rollers, which are a pest in Virginia orchards. According to the announcement, the disease was first noted in 1949 in the laboratory at the Station. During 1951, experiments were made to see if the virus disease might be spread artificially. This was accomplished by spraying the virus on the foliage on which the caterpillars fed. Further research must be done on the project.

•

Budworm Holds Own

Spruce budworm is being curbed successfully in the Pacific Northwest, but the pest is threatening outbreaks in areas of Montana and Idaho, and in Canada near the Maine border, according to a recent entomological report of the U. S. Department of Agriculture.

Three years of concerted effort by Federal, State, and local organizations against the budworm in the Douglas-fir and white fir forests of Washington and Oregon has cost approximately $2,300,000, but it has saved $63,000,000 worth of timber as it stands in the forest. The survey report of the Bureau of Entomology and Plant Quarantine indicates that timely use of DDT during the past three years has reduced the area of heavy infestation from 887,000 acres in 1949 to 82,000 acres this year. Tree mortality has been confined to less than 10,000 acres. Airplane spraying of more than 2 million acres of budworm-infested forest lands in the two states has been carried on since the intensive campaign was started. An additional 640,000 acres will be treated with DDT this year, and in 1953 the control job on all areas should be finished.

•

Ant Control in Citrus

In seeking ways of controlling ants in citrus groves, insecticides of the newer type, in both sprays and dusts, were employed in California. Since sprays were found to last longer than dust applications, the former method was adopted for tests on citrus.

A dosage of two pounds of actual chlordane—four pounds 50% wettable powder or five pounds 40% wettable powder—per 100 gallons of water was found to give control of ants on orange and lemon trees for as long as six months. An emulsifiable concentrate of chlordane, applied at the rate of two pounds actual chlordane per 100 gallons of water gave about the same degree of control.

Parathion—applied at the rate of one pound actual—four pounds 25% wettable powder—per 100 gallons of water, gave good initial control of ants and retained its effectiveness for approximately three months. After that, reinfestation occurred very rapidly.

Toxaphene used at the rate of two pounds of actual toxaphene—five pounds 40% wettable powder—or an equivalent amount of emulsifiable concentrate per 100 gallons of water, proved ineffective against the Argentine ant. Three weeks after treatment with toxaphene the ant infestation was reduced only approximately 50%.

Two other new materials, aldrin and dieldrin, were applied as sprays for ant control. Both were applied at the rate of two pounds of actual toxicant per 100 gallons of water, using both emulsifiable concentrates and wettable powders. Results to date indicate that the emulsifiable form of both materials will give

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*August, 1951 research study.

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longer residual action than the wettable powder. Six months is about as long as one application of either of the above materials will keep the ants from a grove. These two materials will require further evaluation before they can be recommended for use.

In all experiments reinfestations usually occurred on trees around the border of the ant-control plots, and sometimes on a few scattered trees inside. This indicates that after a complete treatment of the grove, only the borders and a few isolated trees inside require subsequent treatments.

Chlordane is recommended as a spray, applied at the rate of two pounds of actual chlordane to 100 gallons of water—four pounds 50% or five pounds of 40% wettable powder, or 1½ pints of 45% emulsifiable concentrate. It controls ants in citrus groves for about 6 months.

To achieve satisfactory ant control a thorough application of the chlordane spray must be obtained. The following places should be sprayed: 1, the trunk of the tree until run-off occurs; 2, the skirts where touching the ground, both inside and out, but never higher than one to 1½ feet from the ground; and 3, the litter beneath the tree. A regular type citrus gun and a number seven disc, with 300 to 400 pounds pressure, should be used. Between 200 and 300 gallons of spray per acre are required, the quantity depending upon the size of the tree, the density of the foliage, and the amount of litter beneath the tree.

Sprays for ant control may be applied in the spring as soon as the ants become active—normally, during the last part of April or the first part of May. If the spring treatment is missed, a summer spray for ants can be applied. Another satisfactory time for applying ant sprays is in the fall—in September or during the first part of October.

The timing of spray applications with relation to cultural practices is very essential. Sprays applied just prior to irrigation or cultivation lose their effectiveness rather soon; it is better to spray just before the ground will remain undisturbed for a long interval.

Experience to date has indicated that spray materials applied for control of other citrus pests are compatible with ant sprays.

The spray materials used in these experiments are poisonous chemicals, and precautions recommended by the manufacturers must be observed rigorously.

—Paul D. Gerhardt, assistant entomologist, U. of Calif., Riverside, in *California Agriculture*, May, 1952.

•

Fungicides Evaluated

Leafspot caused by *Cercosporella albomaculans* is serious in some seasons, especially after the first cutting, due to a buildup of inoculum. Control sufficient for commercial processing was obtained by 2 applications of either 3-3-50 bordeaux or 1 pound ferbam to 50 gal. water, but bordeaux caused severe injury. For the second crop a bordeaux application immediately after the first cutting had an eradicant action and the plants were not materially damaged at this stage. Ferbam applied approximately 10 days later protected the foliage until harvest with no objectionable residue. Fixed copper and zineb spray and dusts were unsuccessful, due apparently to insufficient adherence in a period of frequent showers.

—J. O. Andes, "Fungicides for Turnip-Green Leafspot Control," in *Phytopathology*, May, 1952.

•

Grain Protection Program

A grain sanitation program, being carried on jointly by the Food and Drug Administration, the Fish and Wildlife Service, and USDA, is expected to promote the extensive use of residual sprays by farmers and elevator operators this year to kill storage insects and help prevent infestation of newly harvested grain. USDA officials believe that correctly used, residual insecticides can do much to maintain stored grain at top quality and save millions of bushels usually destroyed by insects.

DDT and methoxychlor sprays at 2½ per cent concentration, and sprays containing 0.5 per cent pyrethrum or allethrin are recommended by the Bureau of Entomology and Plant Quarantine. Methoxychlor, pyrethrum, and allethrin sprays are considered entirely safe and can be used according to directions without fear of health hazards. All of these sprays should be applied at the rate of 2 gallons per 1,000 square feet of wall or floor surface. However, DDT sprays should be used with caution and applied only at recommended dosages. While the evidence available does not indicate that the use of DDT in grain bins is a health hazard, further investigations are under way to determine the exact amount that might rub off the walls onto the grain.

Pharmacologists and toxicologists have indicated that chlordane should not be used where it might contaminate foodstuffs, and previous recommendations for its use on bin walls should be discounted. Research is being conducted to determine if grain in bins with walls sprayed with chlordane might pick up objectionable amounts of the insecticide, and until this fact is determined, the Bureau recommends that chlordane not be used as a residual spray in grain bins.

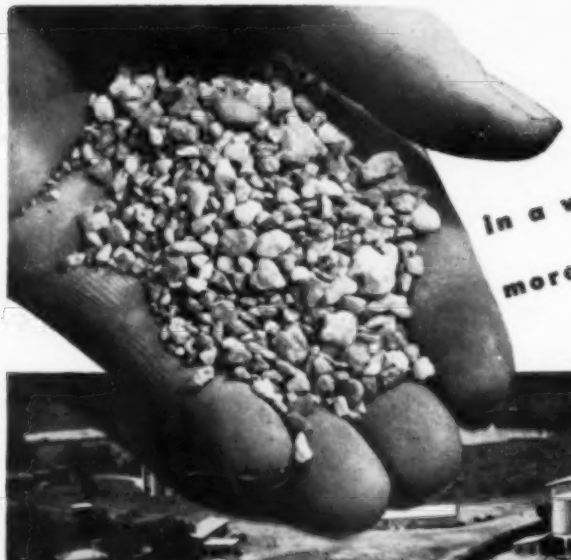
•

Pest Toxicants Compared

Contact insecticides may be influenced in their activity by temperature, relative humidity, and by the amount and quality of the insects' food. The functioning of liquid applications also is directly influenced by their wetting and spreading qualities.

The following discussion of toxicity is largely restricted to the older forms of insecticides, as such data has had but limited development for the newer types of organic insecticides.

Nicotine. A number of alkaloids are used as insecticides, but of these nicotine is the most important. Commercial tobacco yields besides nicotine, very small quantities of a number of other alkaloids; but of these only two, anabasine and nornicotine, are important as insecticides. The toxicity of the alkaloid nicotine (free nicotine) is generally recognized



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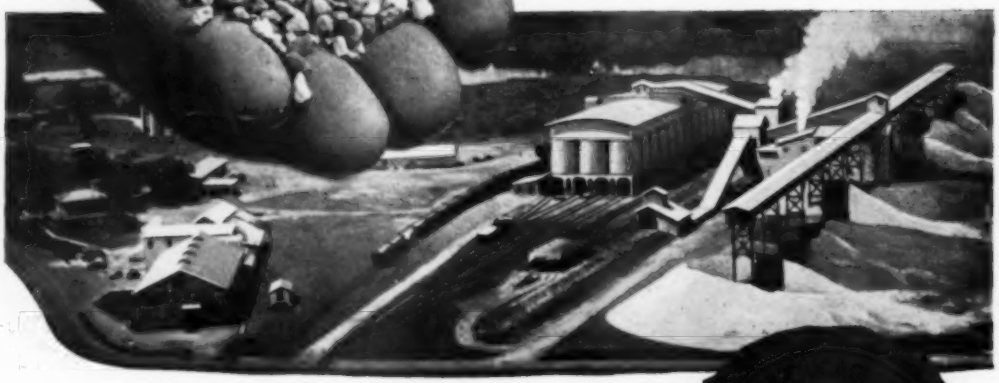

Air view showing dryers and rock storage at Pierce, Florida, headquarters of A.A.C. phosphate mining operations. (Top) Sample of Florida Pebble Phosphate Rock, source of phosphorus widely used in the chemical industries, in its elemental form as well as in phosphoric acid, phosphates and phosphorus compounds. Q This pebble rock is also the principal source of the most important—and most generally deficient—plant food element. Often called the Key to Life, phosphorus is essential in maintaining and improving crop yields. Health, growth, life itself, would be impossible without phosphorus . . . so in a way these phosphate pebbles are more precious than gold.

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as greater than that of its salts (example: nicotine sulfate). Among the other alkaloids derived from tobacco, only dextronornicotine and anabasine have been shown experimentally to be equal to the action of the alkaloid nicotine.

Nicotine is commonly marketed as nicotine sulfate since in this form it is practically nonvolatile. The toxicity, like its volatility, increases in proportion as small amounts of alkali are added up to the point of freeing the alkaloid completely from combination.

Pyrethrum The derivatives of this plant, pyrethrins and cinerins, are true contact insecticides. Pyrethrin I and cinerin I are both rated as more toxic than the corresponding type II compounds.

Rotenone acts both as a contact and as a stomach insecticide, its action is slow but effective for several days. Oral ingestion of rotenone and derris powders, by the higher animals, is more dangerous than that of the pyrethrins.

DDT This insecticide is noted for its stability and long residual value. It is widely used against insects attacking orchards, truck crops and lawns, but restricted in its use on dairy cattle and those in the feed yard, because of its absorption in the fatty tissues and secretion in the milk. These restrictions are of a precautionary nature as there are no known toxic symptoms to humans resulting from the use of milk containing 1 or 2 p.p.m. of DDT. A related product, methoxychlor, is considered to be a safer material for fly control on cattle and is recommended for use in dairy barns.

The range in micrograms of DDT per gram weight of insect to give a 50 percent kill is stated to be 2 to 21 for the house fly, 5 to 8 for the adult mosquito, 27 for the human louse and 63 for the bedbug.

Benzene hexachloride in the commercial form commonly contains five isomeric forms of which the gamma isomer is the most toxic and is also more free of unpleasant odors. This isomer is stated to be 18 times more toxic to house flies than is the standard pyrethrins-kerosene fly spray. The highly purified form of the gamma isomer is now marketed under the name of lindane.

Organic Phosphate Insecticides The earliest form of the phosphate insecticides, marketed in the United State, was too unstable for general use and has been replaced by a more stable form, tetraethyl pyrophosphate (TEPP). This material in its pure form is rated as about 20 times as toxic as nicotine alkaloid, while the commercial form is rated as 3 to 5 times as toxic. Its toxic action is greatest above 50 to 60°F. The material is very toxic to human beings by oral ingestion, inhalation of the fumes and absorption through the skin. Parathion is similar in its toxicity to humans but is more stable as an insecticide, being effective for from 10 to 20 days.

Abstract of paper presented by Dr. E. R. deOng, Albany, California, at the VI International Congress of Comparative Pathology, Madrid, Spain, May 4-11, 1952.

"Aerotil" Developed as Soil Conditioner

AMERICAN Cyanamid Company has announced that it has developed and is now marketing a new synthetic soil conditioner in two forms—easily soluble, highly concentrated flakes for sprinkling, and a powdered compound for "raking in" applications.

The soluble flake form, developed chiefly for the home owner, is the first of its kind to reach the market. This flake dissolves readily in water and is said to contain a higher concentration of active ingredient than any conditioner now available. Chemically, both are hydrolized polyacrylonitriles, sold to manufacturers under the trade name, "Aerotil."

Development of the new soil conditioner follows fifteen years of pioneering by Cyanamid in the field of chemistry made possible by acrylonitrile, a nitrogen chemical introduced by the company in 1940. The company has also been active in the field of soil stabilization for four years. Cyanamid is now the nation's only commercial producer of acrylonitrile which is the basic ingredient of many polyacrylate and hydrolized polyacrylonitrile materials.

"Aerotil," the makers state, acts not only as a soil conditioner, but also as a soil stabilizer. If handled correctly, it can turn eroded, caked soil into a loose, water-absorbent structure which permits plant seedlings to emerge easily and adds to their vigor by allowing air and water to reach their roots.

As a soil stabilizer, "Aerotil" maintains the loose soil structure, resists the action of micro-organisms and holds tightly to the soil near the surface against the leaching effect of severe rains.

Soluble "Aerotil" contains 83% of active ingredient and special additives to permit it to dissolve quickly in water. The dry form contains 40% of active ingredient plus other ingredients to allow uniform mixing in the soil.

Cyanamid's announcement of the new soil conditioner listed the following beneficial effects:

1. Creates granular, porous soil structure with marked stability under influence of rainfall and other weather factors.
2. Prevents surface baking or crusting of soil.
3. Increases absorption and retention of water by soil.
4. Controls sheet erosion.
5. Improves drainage and better aeration, both contributing to good root systems and better utilization of fertilizers.
6. Aids in the formation of soil mulch which reduces water loss through evaporation.
7. As a result of above effects, soil is more friable and cultivation or working of soil can be done more promptly after rain.

The company emphasized that there are certain soils and conditions which "Aerotil" is "not likely to improve to any marked extent." Based on present knowledge, the company said that the product:

1. will not improve very much the physical condition of light sandy soils, although where crusting oc-

(Turn to Page 115)

Herbicides Blamed in Ark. Cotton Loss

By
Inez H. McDuff

THE sudden destruction of young cotton plants on forty thousand to fifty thousand acres in 25 Arkansas counties, beginning about May 9, has caused withdrawal from the market of two pre-emergence chemicals which had been used successfully for the past six years.

Dow Chemical Company and Standard Agricultural Chemicals Co. sent experts to the area to check up on the apparently freakish performance of their products and have halted distribution until the matter is clarified.

A week later, cotton growers, research experts in both cotton production and agricultural chemicals, and other agricultural leaders of the mid-south gathered at Marianna, Ark. to review the situation with officials of the University of Arkansas's Cotton Branch Experiment Station. Similar outbreaks of cotton damage have occurred at various points in Louisiana and Mississippi, it was reported.

The pre-emergence weed killers produced and distributed by Dow and Standard have been widely used in Arkansas and were officially recommended by the University of Arkansas College of Agriculture this year. But their use "unquestionably" contributed to the death of productive cotton this year, observers reported at the Marianna meeting.

One grower, M. L. Walt of Pulaski County, sent reports typical of hundreds of others. "I began planting 150 acres of cotton about 10 days ago," he said, "and applied two quarts of 'Premerge' solution to the acre." Mr. Walt's use of the chemical was in line with his previous experience and he reported that everything was going according to schedule until May 9 when he found that plants one to two inches high had wilted.

The grower theorized that hard rain which had fallen on the previous day, accompanied by a 64-mile-per-hour wind, had bruised the tender young cotton stalks and permitted the chemical to penetrate the protective wax covering.

Lewis S. Rauton, head of the Arkansas Chemical Company, "Premerge" distributor in Arkansas, visited the fields in Pulaski County, and declared that he had no idea what happened. "The chemical had performed satisfactorily under similar conditions for five years," he recalled.

The two brands of chemicals involved in the Arkansas incident are "Premerge," manufactured by Dow Chemical Co., and "Sinox-PE," by Standard Agricultural Chemicals, and distributed in the south by General Chemical Company of Birmingham, Ala. Farmers with supplies of either on hand, have been advised not to use them until further notice.

These and other pre-emergence products had received approval of the Delta Branch Experiment Station at Stoneville, Miss., one of the most highly regarded research organizations in the south.

The pre-emergence chemicals were recommended for limited use last year as a means of controlling weeds for the first few weeks of a cotton plant's life. The station has approved also the use of other post-emergence chemicals, for control of weeds during the remainder of the cotton season. The latter chemicals, manufactured by Lion Oil Company, El Dorado, Ark. ("Lion No. 1") and the Standard Oil Company ("Esso 38"), are not involved in the current cotton losses.

Dr. Paul J. Talley, head of Lion's Weed Control Division at its El Dorado chemical plant, formerly was in charge of weed investigation at Stoneville. In March, 1950, while at Stoneville, Dr. Talley issued recommendations that only oil-soluble materials be used in certain areas as a pre-emergence chemical. He maintained that water-soluble materials might be used satisfactorily when the early planting season is dry, but declared that weather conditions might alter the results.

Last March 18, before development of the current trouble, Dr. Talley issued a letter to customers of the Lion chemical plant urging caution in use of water-soluble pre-emergence herbicides in open and porous sandy type soils.

C. A. Vines, associate director of the Arkansas Agricultural Extension Service, declared that there was more potential danger in pre-emergence herbicides than had been realized, although they had been tested under all conditions. The Extension Service has not withdrawn its recommendation of the pre-emergence herbicides, but has urged experimental application of the chemicals to a small acreage for a year or two by each farmer until he gains experience in handling the preparation.

Both Extension Service and commercial research observers noted that unusually low temperatures for the season prevailed when the cotton died unexpectedly and that heavy rainfall was involved. Others reported that their cotton had "come up dry" in high temperatures shortly before the mysterious crop failure.

All who are interested in the current studies of the situation seem to agree that soil types, weather conditions, moisture, and the amount, kind and type of rainfall are involved in the effectiveness of pre-emergence herbicides and that much experimental work remains to be done in the

(*Turn to Page 123*)

Soil Conditioner Market in Confusion

JUST where the soil conditioner market is leading the industry was a matter of considerable concern to many as this issue went to press. Most manufacturers contacted for a statement declared that it is yet too early to make any kind of guess as to future market potentials of the now-numerous conditioners. One spokesman summarized his views by saying, "We'll just have to wait and see what the current season develops in the way of demand. This, of course, will depend in turn upon how well the buyers like the results of their applications of the next few months."

Judging from the brands being currently advertised in all kinds of consumer publications, it appeared to be no wonder that trade spokesmen were watching anxiously as the public listened to the claims made by scores of soil conditioner manufacturers. Among the trade-named products listed, in addition to the better-known "Krilium" and "Aerotil," are "Fluffium," made by Henry A. Dreer, Inc., Philadelphia; "Hybro-Tite," Potash Rock Co., Lithonia, Ga.; "Loamium," by White House Co., Harrison, N. J.; "Acri Soil," by AcriSoil Co., Newark, N. J.; "Soilife," by Nott Manufacturing Co., Mt. Vernon, N. Y.; "Terra-Kem," by Niagara Chemical Division of Food Machinery & Chemical Corp., Middleport, N. Y.; "Acrylon," made by American Polymer Corp., Peabody, Mass.; and "Poly-Ack," by Wilson Organic Chemicals Co.

But by the last of May, the confused picture was apparently turning into a battle between American Cyanamid Co., makers of a soil conditioner, "Aerotil" and Monsanto Chemical Co., producers of "Krilium."

According to the *Wall Street Journal* of May 29, American Cyanamid Co. had halted shipments of acrylonitrile to Monsanto, although the latter firm is not now using this material in the manufacture of its soil conditioner.

"Educated guesses" in the industry indicated that the friction started over Cyanamid's wanting a long-term contract from Monsanto to supply part of the acrylonitrile requirements for "Acrilan," a new synthetic fibre, the article said. Since Monsanto is building its own plant for the manufacture of acrylonitrile, it was not inclined to sign up for a long-term agreement.

Probably the most serious over all effect of the turmoil of frenzied merchandising will be in the reaction almost sure to come from the public's having too many conditioners appear too quickly. As expressed by one important figure in the manufacturing field, the whole idea of soil conditioners could get a serious black eye because of too many people rushing in to buy products, many of which lack adequate testing, and applying them willynilly at all strengths and in unorthodox ways.

If the results are disappointing, the natural thing is to say that the whole idea is a fad and will be discarded soon. "Actually," said this manufacturer, "We think that the future of soil conditioners is bright, particularly in the agricultural field; but the idea may have to go through some growing pains before it comes of age. The picture today, of thousands of pounds of materials being sold without adequate previous knowledge on the part of either the buyer or the seller, is almost bound to bring trouble. I only hope that the difficulties won't be too serious."

•

CSC Appoints R. C. Wood

Richard C. Wood has been named assistant to Abbott K. Hamilton, vice-president in charge of product divisions of Commercial Solvents Corporation.

For the past sixteen years, Mr. Wood has held executive and development positions in the chemicals industry and previously with General Aniline and Film Corporation. He holds degrees from the University of Rhode Island and New York University.

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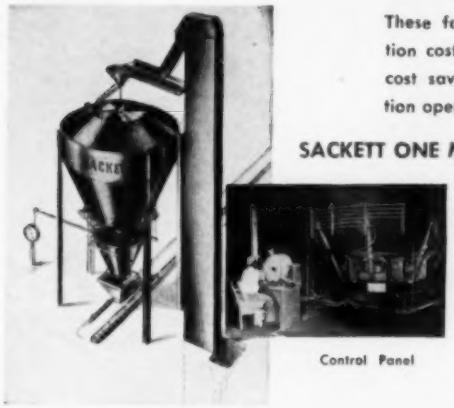

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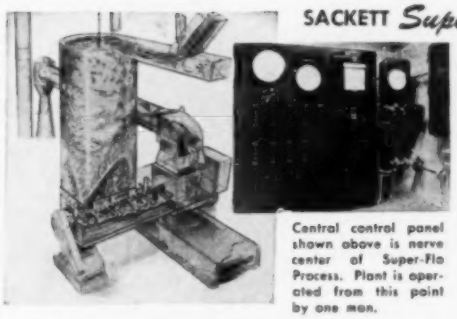

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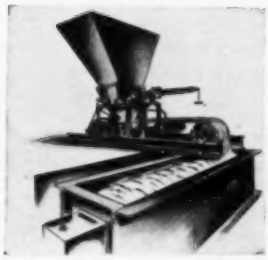

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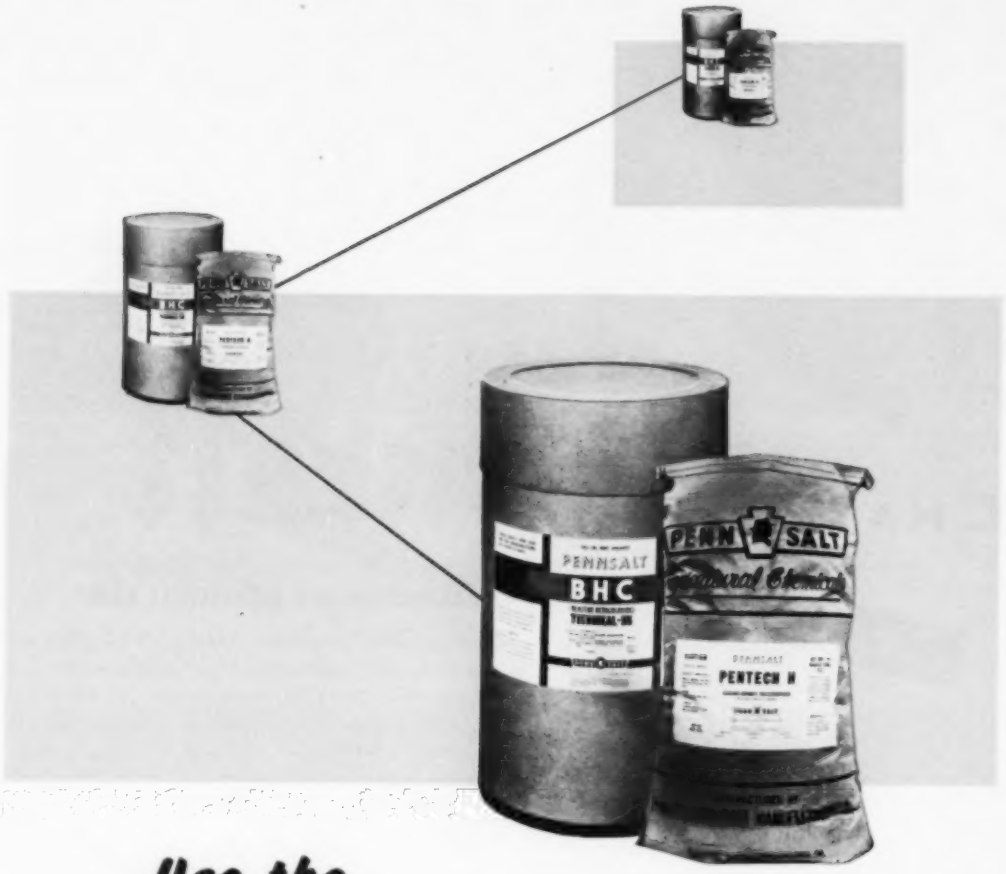

Use the one-two wallop of Pennsalt BHC-DDT

Here are two powerful, chlorinated insecticides which you can use in combination to control a wider range of insects . . . especially in cotton formulations and for cattle sprays and dips.

But whether you use them together or singly, you gain certain formulating advantages which are built into these modern, Pennsalt-developed products. Compare these Pennsalt features with those of other insecticides.

1. PENNSALT BHC TECHNICAL 36—up to three times as much of the gamma isomer . . . the *active* isomer against insects . . . proportionately less of the others. Less to handle, ship and store . . . better field strength formulations.

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Other Formulating Aids Available

Pennsalt DB-50
(50% DDT dust base)

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Always remember that you gain by dealing with a basic producer, and Pennsalt is a leading *basic* producer. This assures you of uniformly high quality, dependable source of supply, and economy. And Pennsalt has the technical know-how to help you spray-apply these insecticides at lower melting points during impregnation. Write us for technical assistance. Agricultural Chemicals Dept., Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa., Tacoma, Washington; Bryan, Texas; Montgomery, Alabama; Portland, Oregon; Los Angeles, Berkeley, Calif.

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With Insecticides or Soils-

It's Careful Preparation that Counts

The farmer knows that careful soil preparation is mighty important in growing finer crops. And he knows, too, that it takes careful preparation to make reliable agricultural chemicals. That's why so many growers depend on Ashcraft-Wilkinson, makers of fine chemical products since 1911.

Ashcraft-Wilkinson's modern laboratory assures you tested, dependable products, and branch offices are conveniently located to provide friendly, efficient service.

TOXAPHENE 40% · TOXAPHENE LIQUIDS · BHC · ALDRIN · PARATHION · DDT · SULPHURS · DIELDRIN
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INDUSTRY NEWS

Plan Phosphorus Talks

A national phosphorus symposium relating to soils and fertilizers will be held at the University of Illinois on August 26, 27 and 28, 1952, sponsored jointly by the National Soil and Fertilizer Research Committee, Soil Science Society of America, American Society of Agronomy, and the University of Illinois.

The symposium will consist of five half-day sessions and one evening session. A total of 15 papers will be presented, with the following topics to be discussed: (1) Phosphorus nutrition of plants, (2) Chemistry of soil phosphorus, (3) Phosphate fertilizers, (4) Phosphorus resources and phosphate fertilizer production, and (5) Soil deficiencies and use of phosphate fertilizers.

The papers will be presented by recognized scholars and investigators in their respective fields. They will consist essentially of critical reviews of the present state of our knowledge on the selected topics, and their views concerning the problems in greatest need of investigation.

The symposium will be held in Gregory Hall, University of Illinois. Housing and dining facilities will be available both on and off the campus. Room reservations can be made by writing to Dr. M. B. Russell, head of the Illinois Agronomy Department, who is chairman of the committee on local arrangements.

•

Pittsburgh Names New V-P

Pittsburgh Coke & Chemical Company has announced the election of W. Kenneth Menke to the newly-created post of vice-president in charge of chemicals. Mr. Menke will be in charge of the general administration of the firm's expanding chemical activities.

Before he recently joined Pittsburgh Coke & Chemical, Mr. Menke had been with Monsanto Chemical Company for 17 years in various operating, research and administrative positions.

•

Simms, New Thurston V-P

The appointment of Robert C. Simms as a vice-president and director of Thurston Chemical Co., Joplin, Mo., has been announced. The action was taken at the April 24 meeting of the board of directors of the company.

ROBERT C. SIMMS

Mr. Simms joined Thurston in 1951 as assistant to the president, Wm. R. Thurston. For the preceding 24 years Mr. Simms had been associated with the Naco Fertilizer Company of New York City. He resigned in February, 1951, as president, general manager and director to join the Thurston Company.

Before entering the industry, Mr. Simms studied agriculture at the University of Illinois and since that time has played an important part in the growth of the fertilizer industry.

•

DDT Export Bids Hit Low

Recent bids on quantities of a million pounds or more of DDT technical and 70% wettable to be exported through the United Nations, stirred quotations considerably under the then current price of some 45c a pound. Nine out of 12 bidders competing for the technical DDT order, went below the market price, two quoted 45c and one went above it.

Successful bidder was John Powell & Co., whose 35.8 quotation was only .4c under the bid of Michigan Chemical Co.'s 36.2. Other bidders and their quotations for technical DDT were:

Kolker Chemical Co.	38.2¢
General Chemical Div.	39.6
E. I. duPont de Nemours & Co., Inc.	40.0
Niagara Chemical Div.	41.7
Wyandotte Chemicals	42.0
Pittsburgh Plate Glass	42.0
Chemical Industries, Ltd. (Canada)	42.0
R. W. Greeff Co.	45.0
Geigy Co.	45.0
Penna. Salt Mfg. Co.	50.25

Bidders for 70% wettable DDT were in about the same order, with the following:

John Powell & Co.	35.48¢
Michigan Chemical Co.	36.26
Kolker Chemical Co.	38.22
General Chemical Div.	39.6
Wyandotte Chemicals	41.0
Geigy Co.	44.5
Heckathorn & Co.	39.35
Prentiss Drug & Chemical Company	40.87
Stauffer Chemical Co.	42.22

•

Bemis Specialist Appointed

R. W. Lahey, Jr., has been assigned to the newly created position of textile and paper bag specialist at the Bemis Bro. Bag Co. plant in Norfolk. In this new position he will work with both manufacturing and sales departments of the Norfolk sales division in the promotion of all products manufactured by Bemis at Norfolk.

•

Fertilizer Employee Dies

James J. McCabe, 67, for 35 years associated with Darling & Co., Chicago, fertilizer manufacturers, died May 13 in Chicago.

AS WE GO TO PRESS . . .

Barrett Forms New Nitrogen Division

EFFECTIVE June 1, Allied Chemical & Dye Corporation has announced the combination of the Nitrogen and Organic Chemicals sections of its Solvay Process Division and the sales agency department of its Barrett Division into a new organization to be known as the Nitrogen Division, Allied Chemical & Dye Corporation, with executive offices at 40 Rector Street, New York.

Hugo Riemer is president of the new Nitrogen Division and M. F. Fogler and F. T. Techter are executive vice-presidents. Messrs. Riemer and Fogler were vice-presidents of Solvay and Mr. Techter occupied the same position with Barrett.

The formation of the Nitrogen Division consolidates the production, sales and distribution of many important Allied products into one organization. These products include nitrogen solutions, anhydrous ammonia, "Arcadian" nitrate of soda, "A-N-L" nitrogen fertilizer, urea products, methanol, formaldehyde, nytron, and other products to be announced at an early date.

Sales of these products will be handled by essentially the same personnel that has handled sales of the same products heretofore:

E. W. Harvey, director of sales; J. J. Porter, assistant director of sales; M.E.Hunter, sales manager, direct application materials; R. M. Jones, director product development W. H. Mortimer, sales manager, sulphate of ammonia; G. E. Reale, sales manager, industrial nitrogen chemicals; G. W. Suggs, sales manager, fertilizer manufacture materials; A. W. Terry sales manager, export; and H. E. West, sales manager, organic chemicals.

The Nitrogen Division will operate and market the output of the Nitrogen plants at Hopewell, Virginia, and South Point, Ohio, the new $25,000,000 nitrogen plant to be constructed near Omaha, Nebraska, and the new organic chemicals plant to be built at Orange, Texas, for the manufacture of ethylene oxide and ethylene glycol.

The Barrett Division and the Solvay Process Division of Allied Chemical & Dye Corporation will continue to function on other operations and products, formerly handled by these Divisions, which have not been transferred to the new Nitrogen Division.

•

Ohio Group Meets in Aug.

The Ohio Pesticide Institute will hold its annual summer meeting at the Ohio Pesticide Institute, Ohio Agricultural Experiment Station at Wooster, on August 13 and 14, according to Dr. J. D. Wilson, secretary of the group. Details of the meeting have not been announced as yet.

•

Monsanto Ups Output

Monsanto Chemical Company has increased its capacity to produce phosphoric acid, ammonium phosphates and potassium phosphates for use in formulating liquid and water soluble fertilizers, according to an announcement by W. R. Corey, manager of phosphates and detergent sales for the company's Phosphate Division. He said that the move was made to help fertilizer manufacturers meet the greatly increased demand by home gardeners and farmers for plant nutrients that are completely water soluble for application as liquids.

Monsanto products, sources of nitrogen, phosphorus and potash, are liquid 75% phosphoric acid, and crystalline monopotassium phosphate, diammonium phosphate and monoammonium phosphate. They are employed in "tailoring" fertilizer formulations to exact nutrient levels. Advantages of the liquid and soluble fertilizers, Mr. Corey said, are high concentration of nutrients, quick availability to plant roots and ease of handling and application.

•

Joins Michigan Firm

Willard S. Fraser has joined the research staff of Calumet and Hecla Consolidated Copper Company, Calumet, Michigan, as supervisor of agricultural research. Dr. Fraser was formerly assistant chemist with the Nova Scotia Department of Agriculture and taught chemistry and soils at the Nova Scotia Agricultural College. He is a graduate of McGill University in agricultural chemistry and did post-graduate work at Michigan State College in soil science.

•

Corrosion Problem Aired

A recent letter from Earle C. Blodgett, plant pathologist at the Irrigation Experiment Station, Prosser, Washington, asks for information regarding control of tank corrosion in connection with the use of insecticides.

"Several orchardists in this area who have been using the new insecticides in orchard pest control, have had difficulty with the tank corrosion problem," he writes. "Local spray advisors have suggested certain rinsing procedures and chemicals, but the problem has not been solved. Even the porcelain liners on the pumps are said to be attacked."

"There may be new developments to control corrosion associated with these new sprays and I would appreciate it if this could be called to the attention of the proper authorities. . . . Of course steel tanks flake off even with old type sprays, but the difficulty is said to be greatly aggravated in recent years. There is a possi-

bility that the trouble has been overstated, but we should like to know, too, whether it exists elsewhere."

Anyone having an answer to this corrosion problem, please contact Mr. Blodgett.

•

Deere May Enter Fertilizer Field as Manufacturer

John Deere & Company, Moline, Ill., makers of farm equipment, are reported to be considering the possibility of starting the manufacture of ammonia and urea, basic fertilizer raw materials.

•

Atlas Expands Service

First steps in a proposed extension of the sales service of its industrial chemicals department have been announced by the Atlas Powder Co., Wilmington, Del. According to George J. King, director of sales for the department, the changes are designed to provide better service for Atlas customers in New York, Illinois, Indiana, Michigan, Ohio and Kentucky.

Under the new plan, Glen P. Roddey, with headquarters in Buffalo, will service customers in northern and western New York while W. A. Kessel will continue to operate from New York City in servicing the remainder of the state.

William I. Pontius, has been assigned to the Chicago office to cover parts of Illinois, Indiana and Michigan. John Slaton has been moved from Chicago to Cincinnati to extend the company's service to the state of Kentucky and the southern part of Illinois, Indiana and Ohio.

•

du Pont Appoints Ham

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced the appointment of Peter Ham to the company's advertising department where he will supervise promotion of agricultural products and the industrial products of the Grasselli Chemicals Department. The appointment became effective on June 1. He succeeds the late George Heller as manager of this division.

For the past eight years, Mr. Ham has been an account executive and agricultural specialist for a New York advertising agency, Batten, Barton Durstine & Osborn where he was in charge of agency activities in behalf of duPont agricultural products.

PETER HAM

The new appointee is a graduate of Cornell University and a native of New York State. He has had wide experience in many agricultural sections of the country and for a time was secretary of the agricultural committee of the National Association of Manufacturers.

At duPont, Mr. Ham will handle information on insecticides, fungicides, weed killers, seed disinfectants, anthelmintics, livestock nutritional supplements, and urea products for both plant application and animal feeding.

•

Louis Ware Given Degree

Louis Ware, president of International Minerals & Chemical Corp., Chicago, received the degree of Doctor of Science from the University of Kentucky, May 30. Mr. Ware, a native of Somerset, Ky., was graduated from the University's college of mining engineering in 1917.

In addition to his being a director of International Minerals & Chemical Corp., Mr. Ware is also a director of the First National Bank of Chicago, the Illinois Central Railroad, the Air Reduction Co., the National Fertilizer Association and the Chicago Association of Commerce and Industry.

•

Hydraulic Batching System

A new system for semi-automatic batching of granular materials was installed recently at the Berkeley, California plant of the Pacific Guano Company, according to a recent announcement of the Rucker Co., Oakland, California, which engineered and built the hydraulic system. The installation is said to speed batching, increase accuracy and cuts needed manpower by 80 per cent. It includes automatic controls and a weighing setup.

Material is fed from six overhead hopper-bottom bins, each of ten tons capacity. Beneath each hopper is a 15" x 15" discharge chute equipped with two single left swing gates superimposed one above the other, and each controlled by a high pressure, oil-hydraulic cylinder.

For full flow, both gates open relatively slowly, and as a unit, feed into a weigh hopper beneath. For dribble flow, the lower gate is opened at high speed, permitting material to flow through an adjustable triangular opening in the upper gate. Dribbling of material to final exact weight is accomplished by fluttering the dribble gate rapidly.

All gates close at high speed, and "cushioning" of closing action starts only after cut-off is complete. The weigh hopper has a somewhat larger hydraulically operated single-leaf swing gate for dumping.

Oil hydraulic power operates at 1,500 p. s. i., combining an 8 g. p. m. Dudco pump driven at 1,200 r. p. m. by a 7½ hp explosion-proof motor, a 10 gal. accumulator, and an automatic unloading system.

The batching system is said to be accurate to within one pound in 1000 pounds. Capacity is 60 tons per hours, compared with hand-batching maximum of 15 tons per hour. Manpower for batching by this method is reduced from 20 to three or four men.

Hercules Steel Exec. Dies

George C. McClure, 46, executive vice-president and general manager of Hercules Steel Products Corporation, manufacturer of steel truck bodies, hoists, and other truck equipment, died suddenly of a heart attack, at his home in Galion, Ohio, Saturday April 26.

As an executive of Hercules Steel Products Corporation, with central plant in Galion, Ohio, and a branch in St. Louis, Mr. McClure was widely known in the automotive and construction industries.

•

Pacific Group to Meet

The soil improvement committee of the Pacific Northwest Plant Food Association has announced its third annual regional fertilizer conference to be held at the Brannock Hotel, Pocatello, Idaho, July 9, 10 and 11. Scheduled to fit in with a Fourth-of-July vacation in Yellowstone and located in the heart of the great phosphate deposits area of the U.S., the meeting is expected to draw a large attendance from a thousand-mile radius. The conference is intended to provide an opportunity for fertilizer field men, technicians, county agents, extension and experiment station specialists to meet, exchange ideas and to get the latest information from nationally recognized authorities on fertilizer. The manufacture and use of fertilizer in the related problem of soil fertility in the Pacific Northwest, will be discussed.

Among the speakers to appear on the program are: Drs. John Painter of Oregon State and Todd Tremblay and Frank Viets of Washington on "Foliar Analysis;" Drs. George Bateman and Jay Haddock of Utah, G. O. Baker of Idaho and Lewis B. Nelson of Colorado on "Fertilizers and Soil Fertility," and Dr. Kenneth D. Jacob, chief of fertilizer and agricultural lime division, B.P.I., Beltsville, Maryland, on phosphate fertilizers for western agriculture. A number of specialists with the fertilizer industry will discuss technical phases of fertilizer manufacture and processing.

The program follows:

July 9—A.M. Foliar and Soil Analysis
P.M. Field Trip to Simplot Phosphate Mines and Introduction to the Geology of the Area.

July 10—A.M. Soil Fertility Practices, Problems, and Relationships.
P.M. Field Trip to the Aberdeen Experiment Station, culminating in an evening banquet

July 11—A.M. Phosphate Symposium
P.M. Tour of Simplot and Westvaco Fertilizer manufacturing plants.

Neilson to Arkansas Rice

Fritz Neilson was appointed sales promotion manager of the Arkansas Rice Growers Cooperative Association, Stuttgart, Ark., according to a recent announcement. Mr. Neilson, formerly associated with Hunt Foods, Inc., will be in charge of national sales promotion for Riceland Rice through its food brokers. He has been formerly associated with Stokely-Van Camp, the Green Giant Co., and A. C. Neilson Co.

V-C Chemical Corp. Sponsors Seminar

Virginia-Carolina Chemical Corp. was sponsor of a seminar on "Research and Development" held April 25 at Richmond, Va. At the conference (upper photo, L to R) are: Dr. G. G. Marvin, director of research, Atomic Energy Commission, Washington, D. C.; Dr. H. C. Pollock, head of the General Electric research laboratory, Schenectady, N. Y.; Dr. Lauren B. Hitchcock, president of the National Dairies research laboratory, New York; and Dr. Sydney S. Negus, head of the department of chemistry, Medical College of Virginia.

In the lower photo, Joseph A. Howell, president of Virginia-Carolina Chemical Corp. chats with Colgate W. Darden, Jr., president of the University of Virginia and former governor of the state, and State Senator Lloyd C. Bird, president of Phipps and Bird, Inc. Mr. Darden was the speaker at a joint meeting of V-C research and development personnel and members of the Virginia Section of the American Chemical Society.

Calif. Fertilizer Assn. in Bakersfield Meet

THE California Fertilizer Assn. held a meeting of its Southern California membership April 24, at Bakersfield. The session was in charge of S. B. Tatem, Swift & Co., Los Angeles, CFA president. Sidney H. Bierly, executive secretary and manager, reported on activities of the association since the previous meeting in November, emphasizing the stepped-up public relations program in particular.

Dr. Wallace Macfarlane, Pacific Guano Co., Los Angeles, reported on activities of the soil improvement committee; Ned Lewis, Wilbur-Ellis Co., Los Angeles, outlined the basic materials supply, stating that anhydrous ammonia and other ammonia solutions are receiving increasing acceptance by farmers; and Dr. G. F. MacLeod, Sunland Industries, Inc., Fresno, Calif., acted as moderator during a general discussion of the fertilization of cotton in the state. Dr. MacLeod urged continuing studies of deficiencies in all plant food elements, declaring that there is ample evidence of an increasing need for complete fertilizers in cotton production, although the need for nitrogen still predominates.

The discussion in this regard brought out the fact that 80 pounds of nitrogen per acre has been the rule, although some thought that the figure should be increased by 50 to 120 pounds. The association members noted that a selling job is needed in California to promote the use of fertilizers on cotton to the same degree as it is being used in the southeastern states where its application is universal. The best method for accomplishing this, it was said, is to point out to the farmer the additional cash return through use of proper amounts of fertilizer. However, great care must be taken in recommending methods to farmer customers.

Following the business meeting, the CFA group journeyed to the cotton experiment station, two miles north of Shafter, for an inspection tour of onion and potato trials being conducted by Dr. Oscar Lorenz. Both liquid and dry fertilizer materials are being used in these experiments.

Below: Participants in the recent CFA meeting and tour pictured at two different spots during the day.

•

Ammonia Plant Running

The $2,000,000 anhydrous ammonia plant of Hooker Electrochemical Company has started operating at Tacoma, Washington. The unit was constructed to serve the growing requirements of the chemical industry and the pulp and paper mills of the Pacific Northwest. Its entire production has been contracted for and plans are already under consideration to increase its capacity by 50 per cent. The output of the plant for the time being will be shipped entirely by tank car.

Hydrogen required for the process is obtained from Hooker Type S and S-3 electrolytic cells which convert salt brine into caustic soda, chlorine and hydrogen. Nitrogen is obtained from the air by means of liquifying equipment supplied by L'Aire Liquide of Montreal. Design and erection were supervised by Chemical Construction Corporation.

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A PRODUCT OF NEW MEXICO U.S.A.
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HIGRADE MURIATE OF POTASH 62/63% K_2O
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A WHOLE FARM THRIVES ON NOURISHMENT

Good nourishment is the secret of healthy growth . . . and the key to profitable farming. Both animal and vegetable life, feeding on the soil 24 hours a day, make a tremendous drain on a farm's rich plant-food elements. The wise farmer knows that these elements must be restored to the earth if his livestock and crops are to prosper.

To "feed the land" that it may better feed the living things he grows, the farmer depends upon soil-replenishing fertilizers. Many of the most effective of these fertilizers contain POTASH . . . often Sunshine State Potash, a product of New Mexico. Potash is not only a soil nutrient; it strengthens crops as well, building up their immunity to disease and drought and improving prospects for a healthy harvest.

UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

Shields Joins Vanderbilt

Dalton Shields has been appointed southeastern sales representative for the R. T. Vanderbilt Co., Inc., New York. He will call on the

Dalton Shields

pesticide trade in the interests primarily of "Pyrax ABB" and "Continental" clay, Vanderbilt products.

Mr. Shields was reared on a general farm in south Alabama, attended Alabama Polytechnic Institute at Auburn, receiving his B.S. degree in agriculture in 1941. After graduation, he was employed as farm supervisor for the Farm Security Administration before being called into service with the U.S. Army Air Force for 4½ years.

After his army service, Mr. Shields served as assistant county agent of Geneva County, Alabama, for five years prior to joining Vanderbilt.

Mr. Shields has recently spent several months at the Vanderbilt laboratories in East Norwalk, Conn., training for his new duties. He will be based at College Park, Georgia.

•

Safety Awards to Pennsalt

Four units of the Pennsylvania Salt Manufacturing Company have been awarded Pennsalt President's Safety Contest plaques for perfect safety records during 1951 and two of these units also were awarded plaques for the same record by the National Safety Council.

The two units which received both awards were the Cornwells Heights, Pa., plant, and the Whitemarsh Research Laboratories at Chestnut Hill. The other two winners were the public utility subsidiaries at Natrona, Pa., considered as one unit, and the Montgomery, Ala., plant, neither of which was eligible for the National Safety Council award.

•

Scientists Honor Horsfall

One of the nation's top scientific honors has been received by Dr. James G. Horsfall, director of The Connecticut Agricultural Experiment Station with his recent election as a fellow in the American Academy of Arts and Sciences. He is the third member of the Connecticut station staff to be so honored. Other fellows in the Academy are Dr. Hubert B. Vickery, head of the station's Biochemistry Department, and Dr. D. F. Jones, head of the Genetics Dept.

Since 1948, Dr. Horsfall has been director of the Connecticut Station, heading its department of plant pathology for nine years before this appointment.

Dennie Advanced by Chase

H. E. Dennie, formerly Chicago sales representative for Chase Bag Company, has been appointed sales manager of the firm's Philadelphia branch territory.

The promotion was announced from Chicago by R. N. Conners, vice-president and general sales manager.

•

APS to Ithaca in Sept.

The American Phytopathological Society has announced that its 44th annual meeting will be held at Cornell University, Ithaca, N.Y., September 8, 9 & 10.

Details of the program have not been announced as yet, but many papers are expected to be submitted for presentation. Officers of the Society for 1952 are: George L. McNew, Boyce Thompson Institute, Yonkers, N.Y., president; G. F. Weber, Agricultural Experiment Station, Gainesville, Fla., vice-president; S. E. A. McCallan, Boyce Thompson Institute, secretary; and A. E. Dimond, Conn. Experiment Station, New Haven, treasurer.

The convention will be held in connection with the American Institute of Biological Sciences, including the Botanical Society of America; the Mycological Society of America, and the Potato Association of America.

The National Agricultural Chemicals Association has announced that the Fungicide Colloquium has been scheduled again in connection with the meeting. As in the past, manufacturers will have the opportunity to present information on new or improved products. Company representatives will be permitted to discuss their products on the basis of technical data and information (but not for sales promotion).

Those wishing to be represented at the colloquium should prepare 150 copies of the statement on each product, including data and other information on performance, to be available to those in attendance at the meeting.

The NAC says that products acceptable for presentation are:

1. New Fungicides available for experimental testing in 1953.

2. New fungicides commercially available or to be marketed for 1953 season.

3. Improvements made on older fungicides, or extended new uses for them.

4. New fungicides designed for seed treatment.

Names of those to take part in the colloquium were to be sent to the NACA office (Barr Building, 910 17th St., N.W., Washington 6, D.C.) by June 10.

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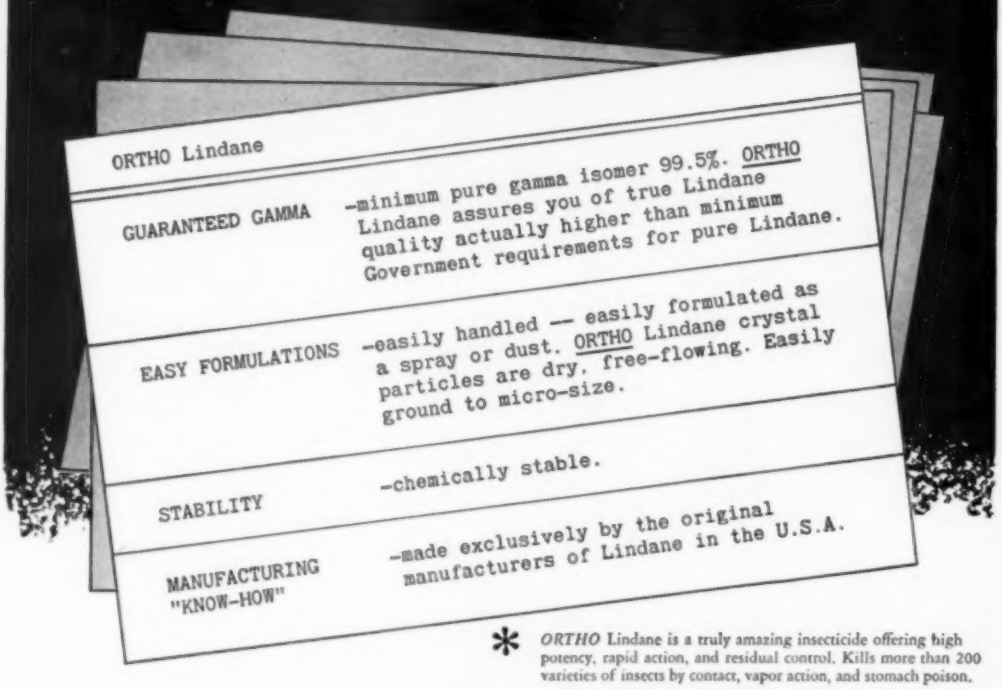
only ORTHO® Lindane* gives you all these advantages:



* *ORTHO* Lindane is a truly amazing insecticide offering high potency, rapid action, and residual control. Kills more than 200 varieties of insects by contact, vapor action, and stomach poison.

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For complete information, "Story of Lindane," write:

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World leader in scientific pest control

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SCIENTIFIC PEST CONTROL

Henderson Joins Stauffer

Stauffer Chemical Company has announced the appointment of George T. Henderson, Jr., as sales representative in Dallas, Texas, with his home office in Houston. Mr. Henderson is a graduate of the University of Texas where he received both his B.A. and M.A. degrees in the field of social science. Before joining Stauffer, he was an assistant in the department of sociology at the University of Texas.

•

P. C. Borax Names Turner

Pacific Coast Borax Co., Division of Borax Consolidated, Ltd., has announced the appointment of J. R. Turner as assistant agronomist for the southern territory. Mr. Turner was formerly an instructor in agriculture at Eastern State College of Richmond, Kentucky and is a recent graduate of the University of Kentucky with BS and MS degrees. He will devote special attention to a study of the boron needs of alfalfa and pastures in Tennessee and Kentucky.

The appointment of Mr. Turner brings to four the number of trained agronomists employed by the company to develop the agricultural use of "High Grade Fertilizer Borate." Dr. James Naftel, assisted by Mr. Turner, is in charge of the research and development program in the southern states and E. W. Kitchen assisted by Grant C. Davis, has charge of this program in the north and midwest. The company has been the leader in developing a scientific program for the use of boron in mixed fertilizers. In addition to its four agronomists, the company is continuing to sponsor cooperative research work being conducted by state agricultural experiment stations.

•

Conn. Honors Dr. Slate

An oil painting of director emeritus William L. Slate of The Connecticut Agricultural Experiment Station was unveiled at a tea and reception in his honor at the station's Britton Auditorium May 16. The painting, by Deane Keller, professor of drawing and painting at Yale University, was presented to the station by a group of friends of the institution, headed by Edward R. Jones, treasurer, Apothecaries Hall, Waterbury.

The formal presentation was made by Mr. Jones and accepted on behalf of the station by Charles G. Morris, of the station's board of control. The portrait will be hung at a later date in the office of the station's present director, Dr. James G. Horsfall.

An All Out Effort to Meet Demand for Nitrogen

Phillips is producing nitrogen fertilizer materials at full capacity. But even our tremendous rate of production isn't always sufficient to meet today's demand. We'll do our best for you. Keep us in mind if you need nitrogen in any form.

AMMONIUM SULFATE—Phillips *66* Ammonium Sulfate is a free-flowing 21% nitrogen material! Mixes easily! Uniform crystals resist caking! Ideal for high-analysis mixed goods! A fine direct application material!

AMMONIUM NITRATE—Phillips *66* Prilled Ammonium Nitrate contains 33% nitrogen. The small, coated prills or pellets resist caking . . . handle easily. Phillips *66* Prilled Ammonium Nitrate can be depended on for uniform, free-flowing properties and top-notch crop response.

NITROGEN SOLUTIONS—More N per dollar! Phillips *66* Nitrogen Solutions are well suited to the preparation of high-analysis fertilizers and the ammoniation of superphosphate. These three nitrogen solutions keep handling costs low . . . promote rapid, thorough curing!

ANHYDROUS AMMONIA—Tank car shipments of Anhydrous Ammonia (82% nitrogen) go out to Phillips contract customers from Phillips production facilities in the Texas Panhandle. Write our nearest district office for full information.

Phillips 66

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A Subsidiary of Phillips Petroleum Company

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Alcoa Grants Scholarship

A foreign student project under the joint sponsorship and mutual co-operation of the export division of Aluminum Company of America, the Herbrew Institute of Technology, the Technion and the Palestine Endowment Funds Inc., New York, will sponsor a graduate student from the Hebrew Institute of Technology, Haifa, Israel, to be brought to America this summer for two years graduate study in Agriculture. His studies in America will be supplemented by an additional year in the Israel school. The student will attend the State College of Washington and his studies will cover agricultural engineering and agronomy in an effort to equip him with the latest American methods concerning soil, soil management, fertilizers and hydraulics.

•

New Intern'l. Construction

International Minerals and Chemical Corp., Chicago, recently started construction for an addition to their amino products plant at San Jose, California, according to an announcement by Louis Ware, president. The addition will consist of a three story backbay attached to the main building.

•

Health Traced to Soil

At a recent meeting of the East Texas Agricultural Council, Tyler, Texas, W. A. Albrecht of the Univ. of Missouri said that the nutritional quality of protein, the inorganic essentials, vitamins etc, necessary for good health have been "juggled out" in the course of working crops into the new farming scheme. He said "It is only when our soils are better in terms of all the essential elements that they grow the complete proteins. Just when are proteins complete? That is still an unanswered question. They should be complete as regards all the eight or ten different amino acids recognized as required for survival."

W. A. Albrecht continued to point out that "When these amino acids are produced to higher concentrations in the food, may we not expect better proteins in the animal and human bodies by which there is protection against invasion by the microbes?"

•

Kraft Advances Personnel

Two Kraft Bag Corp. personnel changes were announced recently. B. T. Miller will now cover Alabama, Mississippi, Louisiana, southwest Tennessee, Arkansas and Texas areas while James W. Taylor has been placed in charge of bag sales, according to the announcements.

Mr. Miller, who formerly covered the middle western territory, will now have his headquarters in New Orleans. He had had experience in bag production before joining the Kraft sales staff.

Mr. Taylor will make his headquarters at the executive offices of the company in New York. He will direct and coordinate the bag sales operations of all branch offices under Harry C. Lawless, vice-president and sales director for Gilman Paper Co.

New Office for C.S.C.

Commercial Solvents Corp. has announced removal of its offices to 260 Madison Avenue, New York 16. A new telephone number has also been assigned to C.S.C. It is LExington 2-6420. The company offices were formerly located at 17 E. 42nd St. and at 745 Fifth Ave., New York.

•

Chase Managers Meet

Managers and sales managers from Chase Bag Company's twenty-nine factories and sales offices convened in Chicago recently for the company's annual Management Conference. In a three-day program held at the Drake Hotel, R. N. Conners, vice-president and general sales manager, conducted discussions about various production and sales phases of the 105-year old firm and the current trend of packaging. "All industry and agriculture are becoming more and more packaging conscious," Mr. Conners said, "with the result that our research laboratories and technical departments are working constantly on new types and methods of packaging."

•

Hercules Names Plant Site

Hercules Powder Company will build its new hydrocarbon chemicals plant on a 275-acre tract near Gibbstown, N. J., the company has announced. The new plant will be located on the Delaware River, slightly northwest of Gibbstown, between the Socony-Vacuum Oil Company plant and E. I. du Pont de Nemours & Company's Repauno plant. The plant, announced last January, will represent an investment of close to $8,000,000. It will employ at the outset 70 to 80 people.

Construction will start late this year, or early next year, depending upon the availability of building materials. When completed, the plant, will produce phenol, para-cresol, acetone, and cymene alcohols, covering about 60 acres of the tract. The additional acreage will provide for future expansion in these operations, "for a long time to come."

A site in the Delaware River industrial section was chosen because both propylene and benzene are available from petroleum refineries and coke ovens in the area. Terpenes will come from Hercules plants in Georgia and Mississippi.

•

Phillips Sets Safety Mark

Employees of the Adams Terminal plant of Phillips Chemical Company, Houston, Texas won a National Safety Council award with a perfect safety record for 1951 in the chemical section of the national safety contest.

The 342 employees celebrated the observance of one full year with no time lost by reason of a disabling accident, with a dinner dance at Houston on May 24. T. L. Cubbage, general manager of Phillips Chemical Company, presented the award to R. G. Rhodes, Adams Terminal superintendent. G. B. Keeler is personnel director, and D. M. Vincent is safety supervisor at the plant.

When you think of

GRANULATION

The John J. Harte Company, for many years, has been associated with the design and construction of many types of fertilizer plants throughout the nation. Much of the combined knowledge gained through these years of experience in the fertilizer industry is brought together in the design and erection of guaranteed production facilities for the granulation of mixed fertilizers.

For a descriptive folder on the "Granulation of Mixed Fertilizer", for a detailed discussion of granulation—or any other type of fertilizer facility—contact any of the Harte offices. There is no obligation.

- Fertilizer Mixing Plants
- Triple Superphosphate Plants
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- Ammonium Sulphate Plants
- Material Handling Systems
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- Sulphuric Acid
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YOU GET THE PROTECTION OF NOT 1 BAG, BUT 2 *when you buy*

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THE LAMINATED BAG

Stronger than burlap alone, **tougher** than paper alone. This double-thickness bag with asphalt (or other adhesive) lamination between the burlap (or cotton) on the outside and the paper on the inside is the **perfect answer** to your packaging problems when contamination, weather conditions, grease, acids or water may disturb the clean, dry, freshness of your product.

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TEXTILE BAG SPECIALISTS SINCE 1885

Cyanamid Names Sommer

Dr. Nolan B. Sommer has been named supervisor of the new product development department of American Cyanamid Company. He replaces Dr. James R. Dudley who recently joined the Carwin Company, North Haven, Connecticut.

Dr. Sommer served as a research chemist in Cyanamid's Stamford, Connecticut, research laboratories from 1944 to 1947, then was made market development manager for Jefferson Chemical Company, a firm jointly owned by American Cyanamid and The Texas Company.

Dr. Sommer was graduated from the University of Nebraska with B.S. and M.S. degrees in 1941 and 1942, respectively, and in 1944 received his Ph.D. from Indiana University.

•

"Systox" is Introduced

Pittsburgh Agricultural Chemical Co., New York, presented a demonstration of its new systemic insecticide, "Systox," before a group of invited guests at the Waldorf Astoria Hotel, New York, May 6. Speakers on the program included Richard M. Marshall, president of Pittsburgh Coke & Chemical Co., parent company; William J. Haude, president of Pittsburgh Agricultural Chemical Co., and Scott James, technical sales director of the subsidiary firm.

Mr. Marshall reviewed the history of his company's entrance into the agricultural chemical field, stating that this phase of chemistry is one of the most significant and important advances in farming. He regarded the idea of a systemic insecticide as being another big step toward control of agricultural pests.

Mr. Haude pointed out that "Systox"' is the first true systemic insecticide to be approved for use in the U.S. and predicted that its effectiveness in ridding plants and trees of aphids and mites promises benefits of millions of dollars to American farmers as use of the systemic becomes more widespread.

He said that approval of "Systox" for use on cotton followed three years of intensive field research. Similar research on tobacco is well under way, Mr. Haude reported, and further, the material is expected to be used to control insects of fruits, vegetables, grains, forage crops and sugar.

In demonstrating the technique used with both plants and trees, Mr. James presented cotton plants which had been treated by injection with the systemic the previous evening. A similar plant was left untreated so that the guests could see insects clinging to it as compared with numerous dead ones under the treated plant.

Mr. James explained that the product kills insects both as a stomach and contact poison. He said that a treated plant will remain toxic to insects "three or four times longer" than conventional insecticides. Rain cannot wash off nor dilute this type of insecticide, he said.

MKG Observes 50th Year

Its fiftieth year in business is being celebrated by McLaughlin Gormley King Co., Minneapolis, processors, formulators and suppliers to the pesticide industry. Founded in 1902 by Alexander McLaughlin, the firm took its present name in 1908 after members of the King and Gormley families became partners in the enterprise.

Twelve years later, the company began the processing of pyrethrum flowers and developed numerous types of extracts and concentrations. MGK produced the first highly concentrated extract which was standardized to contain two grams of pyrethrum per 100 cc. Manufacturers were thus able to produce insecticides of uniform quality and effectiveness.

MGK was very interested in the development of the allyl homolog of cinerin I, known as allethrin, and did a large amount of research and field testing of the material. With the Benzol Products Co., Newark, N. J. producing allethrin under contract, MGK is credited with commercial development of the insecticide.

Officers of MGK are George McLaughlin, president; Carroll A. Clark, vice-president and general manager; Paul D. Torpin, vice-president and general sales manager and Frank J. Radeck, assistant sales manager and a director of the company. Mr. McLaughlin, who became president in 1936, is the son of the founder, Alexander McLaughlin, who died in 1939.

•

Buys Experimental Farm

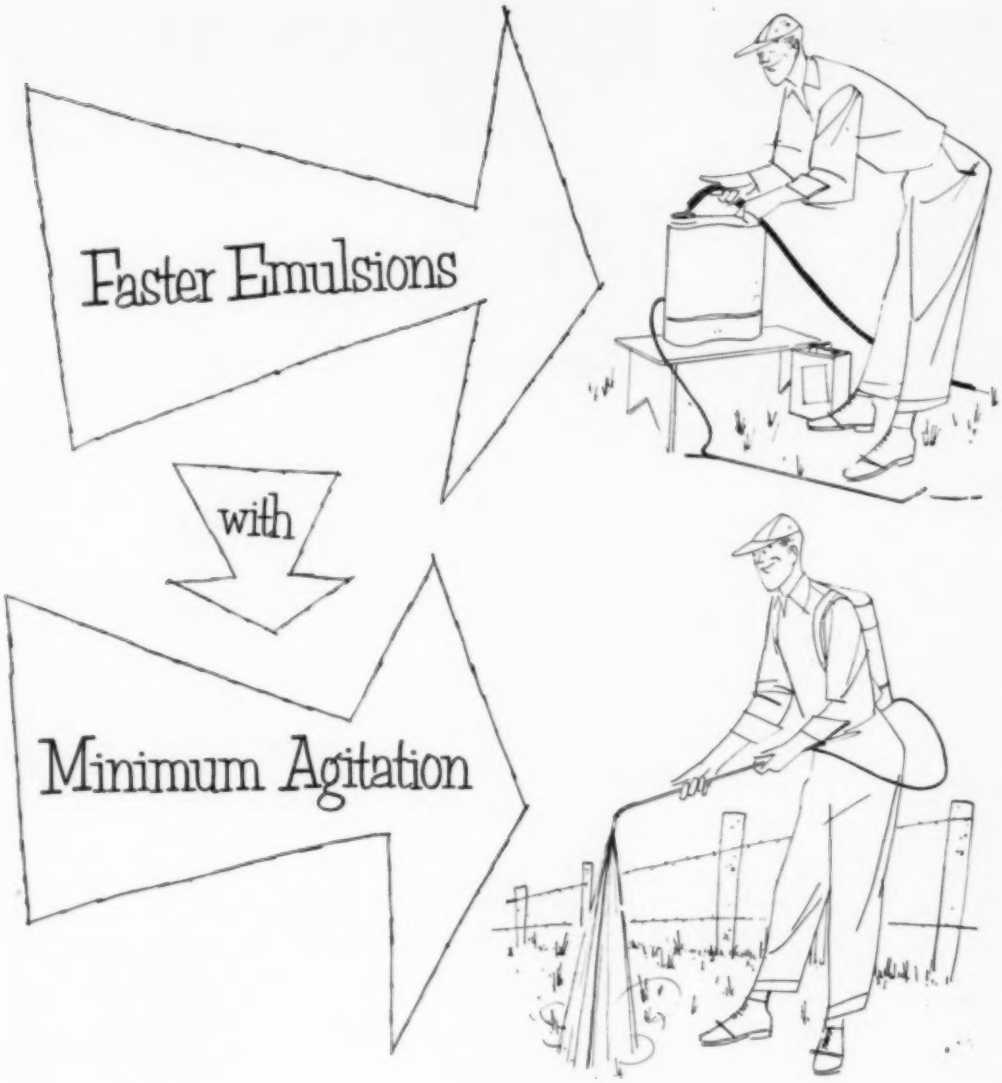
An experimental farm to test "Krilium" soil conditioner and other agricultural chemicals has been established in St. Louis county by the research department of Monsanto Chemicals Division, the company has announced.

The farm, which includes 257 acres, is located south of Utz Lane just west of Feefee Road near the town of Hazelwood, Mo. There will be no manufacturing at the farm site, but activities there will be directed toward practical field testing of chemical formulations of herbicides, fungicides, soil conditioners, insecticides and similar products intended to improve yield and quality of agricultural products.

•

Aerial Spraying Up

D. R. Nelson, regional chief of the Civil Aeronautics Administration's aviation-safety division, recently announced that agricultural aviation in the Pacific Northwest showed a fifty per cent increase in acreage dusted and sprayed in 1951. A thirty-three per cent gain in the number of aircraft used for conservation and agriculture in Washington, Idaho, Oregon, and Montana was also recorded during the year, according to Nelson. A total of 12,746,864 gallons of chemical spray, and 11,845,506 pounds of dust were applied by air to Northwest crops and forestland during the period.



Emulsions last longer — disperse faster — with Armour's Etho-chemicals

Armour's oil-soluble, water-dispersible Etho-chemicals make any emulsification easier and faster—and longer-lasting. For instance, Ethomeen S/12 and Ethomeen S/15, mildly cationic chemicals which are not affected by water hardness, combine to form an excellent emulsifier for 2,4-D isopropyl ester, even in extremely low concentrations.

Another excellent emulsifier is Ethofat 142/20, a non-ionic chemical for use with kerosene or xylol as a solvent. Chlordane can be emulsified directly into water with this chemical, without a solvent.

Write today for complete information about these and Armour's other emulsifiers, including formulas, methods of use, and prices.

ARMOUR CHEMICAL DIVISION

Armour and Company, 1355 W. 31st St., Chicago 9, Ill.

New Plant for Allied

Allied Chemical & Dye Corporation has announced plans to build a plant using natural gas as a raw material to produce urea and other nitrogen fertilizer materials near La Platte, Nebraska, 15 miles south of Omaha. Construction of the plant is contingent upon approval by the Federal Power Commission of Northern Natural Gas Company's application for authority to install facilities to supply natural gas to the proposed plant. The new plant will be the first of its kind in the Nebraska-Iowa farming area.

Options have been acquired on plant sites near the junction of the Missouri and Platte Rivers with frontage on both rivers.

If approval is granted promptly, construction of the plant, involving an investment of approximately $25,000,000, is expected to get under way this summer and to be completed within 18 months to 2 years. When finished, the new operation will employ some 450 people.

Urea will be made from ammonia and carbon dioxide to be produced at Allied's new plant from natural gas. Since urea contains approximately 46.6% nitrogen, as compared with 32.5% or less for other solid nitrogen fertilizers, lower transportation and handling costs are expected to be realized.

The Omaha plant will be operated by Allied's nitrogen division, whose other products include sodium nitrate, nitrogen fertilizer solutions, and ammonium nitrate limestone, a nitrogen fertilizer.

The first successful commercial synthetic ammonia plant in the U. S. was designed and constructed by Allied. This installation completed in 1921 at Syracuse, N. Y., paved the way for construction in 1927-28 of a much larger ammonia plant by the company at Hopewell, Virginia. The erection and successful operation of the huge Hopewell plant made the United States independent for the first time of foreign supplies of nitrogen materials for fertilizers and munitions.

During World War II, Allied constructed and operated for the government synthetic ammonia plants at South Point, Ohio and Henderson, Kentucky. The South Point plant was purchased in 1946 and is the site of the company's first urea production.

Allied's divisions have a large number of plants and conduct operations throughout the United States, producing a wide range of materials. The plant at Omaha will be the first Allied Chemical manufacturing operation in the state of Nebraska.

New Pennsalt Insecticide

"Penthon," a new organic-phosphate type insecticide designed for protection of apples and pears and certain other crops, has been formulated for commercial use by the Pennsylvania Salt Manufacturing Company of Washington. Containing malathon, (compound "4049") as the active insecticidal chemical, "Penthon" provides effective control with reduced toxicity to man, compared with certain other organic

4 Reasons Why IT PAYS TO KILL BRUSH WITH AMMATE®

1 **ONE SPRAY KILLS POISON IVY** when you apply Du Pont "Ammate" weed killer in water on the foliage. Kills roots and all; seldom any resprouting or need for respraying. No fire hazard, spray is not volatile. Equally good for the backyard or a large orchard.

2 **BRUSH CONTROL FOR MANY YEARS** with one application of "Ammate" on this telephone right-of-way is typical of the results industrial users get. Ideal on power, telephone and pipe lines, along roadsides. Brush is killed, but grass comes back.

3 **DEADEN SCRUB TREES FOR SURE** with "Ammate." It can be used in a girdle hacked around the trunk, as above, in notches at the base of the tree, or in sprays on foliage or stumps. Ideal to clear pastures or kill weed trees in valuable timber.

4 **LESS LABOR KILLS MORE BRUSH AT LOWER COST** when you use "Ammate." It kills more kinds of brush than most weed killers, and keeps brush down longer. For details on brush control, write Du Pont, Grasselli Chemicals Dept., Wilmington, Del.

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REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

AMMATE®
WEED KILLER

phosphate pesticides. It has also been tested extensively as a spray and in an aerosol on ornamental plants, and shows good tolerance to a wide variety of plants.

"Penthon" is sold in both powder and liquid form: "Penthon" E-50, an emulsifiable concentrate containing 50% malathon, and "Penthon" W-5, a wettable powder containing 25% malathon. Both the wettable powder and the emulsion may be used with the more commonly known insecticides.

•

IMC Gives Scholarships

Four scholarships for high school seniors who are members of 4-H Clubs or the Future Farmers of America will be awarded each year by the Plant Food Division of International Minerals & Chemicals Corporation beginning with the school term in the fall of 1952, according to Maurice H. Lockwood, vice-president in charge of the division.

Each scholarship will provide a grant of $300 for vocational training or special courses at any accredited institution and will not be renewable. Applicants will be accepted from high schools in areas served by International's 25 commercial fertilizer plants in Alabama, Arkansas, Florida, Georgia, Illinois, Iowa, Kentucky, Maine, Massachusetts, Mississippi, New York, North Carolina, Ohio, South Carolina, Tennessee and Texas.

•

Announces Grants-in-Aid

An expanded grant-in-aid program designed to test new agricultural chemicals on a wide variety of crops under varying climatic and soil conditions has been announced by Columbia-Southern Chemical Corporation, Pittsburgh.

Grants-in-aid will be extended this year to more than thirty universities across the nation. During 1951, the company inaugurated its grant-in-aid program at nine different universities, according to E. T. Asplundh, president.

Columbia - Southern has engaged in a broad research and development program in agricultural chemicals since 1946. The firm supplies basic chemicals to formulators and distributors of pesticides and herbicides.

Mr. Asplundh states that two herbicides promoted by Columbia-Southern-IPC and more recently, Chloro IPC-have been utilized in extensive experimental testing programs in various states on a wide variety of crops.

Westvaco Ups Oskin

Westvaco Chemical Division of Food Machinery and Chemical Corporation has announced the appointment of Donald C. Oskin to assistant manager of sales, replacing John deF. Meyler, who has resigned. Mr. Oskin most recently was director of district sales for the organization and for a time was in charge of Food Machinery and Chemical Corporation's' Washington office.

After Only 4 Months...

39 DEALERS IN 10 STATES

Now Enthusiastically Sell

KBH *DEEPSEAL*

Anhydrous Ammonia Applicator

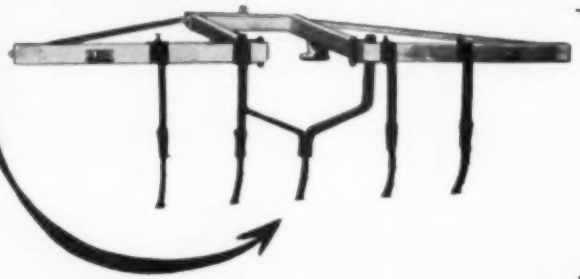
Patent Pending

You get positive penetration with Deepseal. Hydraulic ram and heavy-duty frame force applicator knives to any desired depth up to 12 inches. Double triangle knife tips scoop out underground chamber and seal ammonia in . . . High clearance of rig ideal for side-dressing.

Additional Territories Now Being Assigned To First Qualified Applicants—Don't Wait Till Fall

Here's a new product success story you'll want to hear. The KBH Deepseal anhydrous ammonia applicator was introduced last winter. Two years of tests had proved it to be the first applicator to insure positive penetration in any kind of soil. But other name makes had been on the market several years and were well established. Would Deepseal's advantages overcome this lead with dealers and farmers? Now, after four months of enthusiastic reception in both the Corn Belt and the Cotton South, we know for sure there's always a demand for a good new product that fills a real need.

Pasture Problems Solved by New Middle-Knife Attachment



Now five knives can be spaced as close as 17 inches apart for thorough pasture application and for pre-planting corn and small grain land. The new Middle Knife Attachment is easily mounted or removed with four large bolts. Other uses include side dressing in the middles and applying anhydrous ammonia in the middles preparatory to bedding out.

Think of the profit in introducing KBH Deepseal in your territory! Then fill out the coupon and mail it today.

The **KBH** *Corporation*

Clarksdale, Mississippi

Builders of* EXTRA-STRENGTH *Farm Equipment

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Please send me details about the Deepseal ammonia applicator and dealer franchise.

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Sprout, Waldron Appoints

Sprout, Waldron & Co., Inc., Muncy, Pa., have announced the appointment of Harold Alsted to the position of vice-president of the firm. According to Harold M. Soars, president and general manager, Mr. Alsted's new title will be vice-president in charge of sales.

The new officer joined Sprout, Waldron in 1936. He has had long experience in the grain processing and milling business.

In addition to Mr. Alsted's appointment, the company has also announced the addition of two salesmen: M. L. Skinner and Ollie G. Morgan. Mr. Skinner will operate from Memphis, Tenn., covering that state and also Alabama, Mississippi, Louisiana and Arkansas.

Mr. Morgan will call on the chemical and allied processing industries in Maryland, Virginia, N. Carolina and part of West Virginia. He is a graduate of Pennsylvania State College. For the time being, Mr. Morgan's headquarters will be in Camp Hill, Pa.

•

Dow Appoints Dorland

Jack A. Dorland, veteran New York sales representative of

JACK A. DORLAND

The Dow Chemical Company, has been named manager of the Eastern office of Dow Chemical Inter-American Limited and Dow Chemical International Limited. The appointment, effective June 1, was announced by Clayton S. Shoemaker, president of the two recently organized Dow subsidiaries.

Except for a three-year period as a captain in the Chemical Warfare Service of the U.S. Army, Mr. Dorland has been with Dow Chemical since his graduation from Cornell University in 1931. He has been attached to Dow's New York office continuously during that period, and has had sales experience virtually all the way across the Dow product line including three years in export work. Since 1948 he has been senior salesman in the general chemicals section.

•

Bemis Ups McGrath

P. C. McGrath, formerly sales manager of the St. Louis Sales division of Bemis Bro. Bag Co., has been appointed assistant manager of the St. Louis bag factory and sales division. Mr. McGrath joined the Bemis organization in 1913 and was made sales manager in 1938.

No matter how you look at a Chemico plant

it's a profitable investment

If you are thinking of expanding present facilities or erecting a new plant for the manufacture of heavy chemicals, look into Chemico's all-inclusive service.

PLANNING—All factors that may influence design . . . availability of raw materials and utilities, location of plant site, soil conditions . . . are checked before starting engineering designs. Each Chemico project is planned to meet your specific needs.

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MANPOWER—Automatic operation, centralized control and efficient plant layout minimize manpower requirements. Maintenance is simple. Equipment is never "hard to get at" for repairs.

DELIVERY—Chemico trains the operating crew . . . turns over an efficiently operating plant on a one-contract, one-responsibility, performance-guaranteed basis.

From every viewpoint, a Chemico-built plant is a profitable investment. Proof? 37 years of successful experience in completing more than 800 installations throughout the world.

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Chemico plants are profitable investments

No Fertilizer Legislation Needed

CONGRESSMAN James J. Delaney (D, N.Y.), chairman of the select committee to investigate the use of chemicals in food, on May 12 submitted to the House the first section of a four or five-part report on the work of the select committee.

Titled "Fertilizers," the report announces the committee's "considered judgment that the situation existing in the field of fertilizers does not reveal any need at this time for Federal legislation."

Created by the 81st Congress in June, 1950, the select committee on chemicals in food held hearings in September, November, and December of 1950, and recommended to the House that its investigation be continued. Authority to do so was granted by the 82nd Congress, and further hearings were held during 1951 and 1952.

Four volumes of hearings have been published, covering sessions in New York, Chicago, San Francisco, Los Angeles, and Seattle, in addition to those held in Washington, D. C.

In its report, the committee declared it found "no reliable evidence was presented to indicate that the use of chemical fertilizers presents a hazard to man or animals."

The committee stressed the importance, however, of the use of organic fertilizers, such as farm manures, crop residues, and legumes. "It is the committee's opinion," the report ran, "that more extensive research should be conducted to seek practical methods of conserving and utilizing various wastes and other organic matter for fertilizing purposes. It is the committee's view, also, that long term studies to determine (1) the relative effect of chemical and organic fertilizers upon the nutritive value of crops, and (2) the relationship of soils to human nutrition and health, should be strongly encouraged."

Chairman Delaney said the select committee had decided upon the plan of submitting four or five reports in place of one large one because of the several major topics covered in the investigation. The committee was empowered to investigate the use of chemicals in food products, pesticides, and fertilizers. A further field of investigation was added when Congress authorized the committee to study the use of chemicals in cosmetics. This extension of power was granted last September.

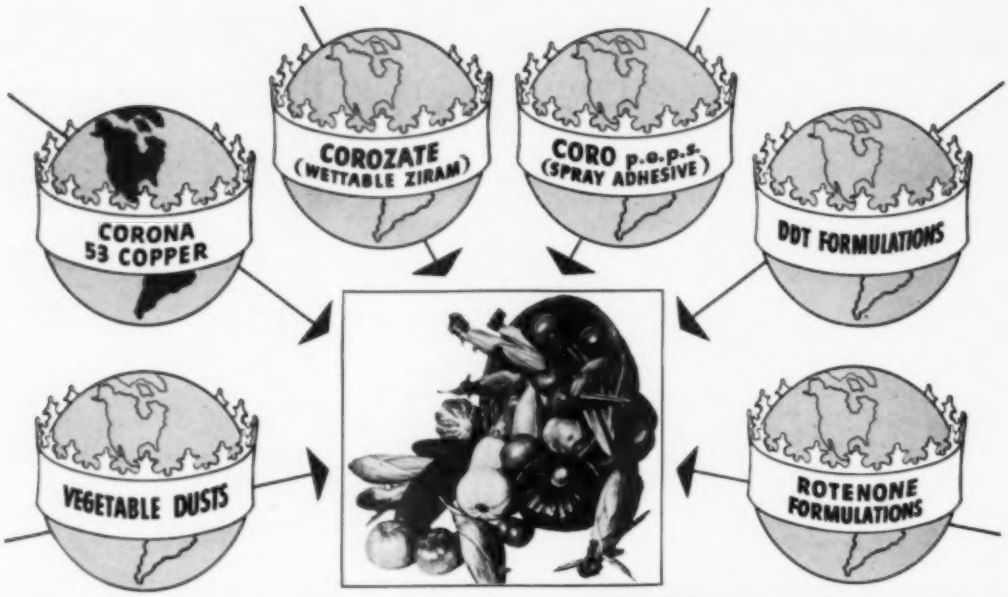
The completion of the remaining sections of the report will be announced as they are submitted to the House.

•

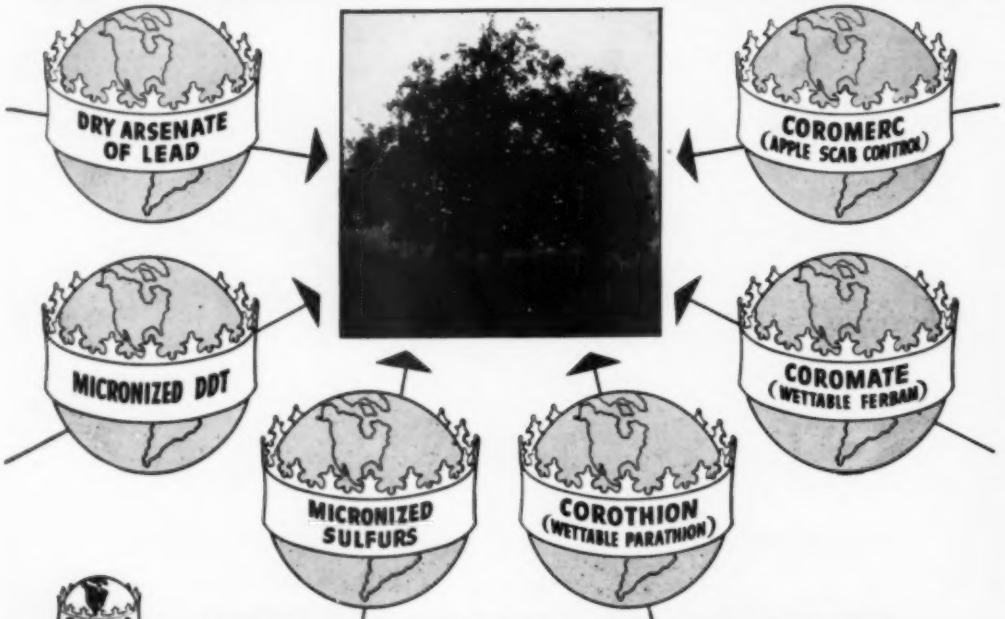
Chase Bag Co. Honored

The Chamber of Commerce, Reidsville, N. C., recently sponsored a banquet honoring Chase Bag Co. whose plant in the town has contributed to the growth and prosperity of the community.

F. H. Ludington, Chase president, acknowledged the honor with a brief talk.



Your Insurance for BETTER CROPS!



CORONA CHEMICAL DIVISION

PITTSBURGH PLATE GLASS COMPANY

MILWAUKEE, WIS. MOORESTOWN, N. J.

CSMA in Boston Meeting

The annual meeting of the Chemical Specialties Manufacturers' Association was to be held at the Sheraton-Plaza Hotel, Boston, on June 8-10. Among the papers to be presented at the conference were "Insect Control by Chemicals," by A. W. A. Brown, Dept. of Zoology, University of Western Ontario, London, Ont.; "Recent Advances in the Knowledge of Housefly Biology," by Luther S. West, Northern Michigan College, Marquette, Mich.; and "Bio-Synthesis of Radio-active pyrethrin C1402," by J. C. Pellegrini, Jr., A. C. Miller and R. V. Sharpless, all of Gulf Research & Development Co., Pittsburgh, Pa.

A symposium was to discuss "Industrial Uses of Insecticides" as part of the program. Scheduled to appear on this panel were George Ferguson, Geigy Co., Inc.; R. T. Orr, Diversey Corp.; W. Schwab, Armour & Co.; and Howard A. Jones, U.S. Industrial Chemicals Co.

"The Use of Insecticides in Public Health" was to be discussed by Justin Andrews, U.S. Communicable Disease Center, Atlanta, Ga.

•

Hall, Miller, Leave Hyman

Julius Hyman and Co., Denver, have announced the resignations of J. Newton Hall, vice-president in charge of sales and Roy J. Miller, vice-president in charge of manufacturing. These terminations became effective on May 1. A message from the company stated that "It is expected that Lloyd M. Joshel, treasurer and Robert L. Silber, secretary will also leave the organization before the end of this year. Mr. Joshel and Mr. Silber have been directors of the company as well as officers."

None of the persons involved in the resignations have announced their future plans. Hyman & Co. was recently purchased by Shell Chemical Corp. following long litigation with Velsicol Corp., Chicago, over the manufacturing and distribution of aldrin and dieldrin insecticides.

Powell Buys Edco Plant

One of two insecticide plants at Elkton, Md., owned by Edco Corp., has been purchased by John Powell & Co., according to an announcement by H. Alvin Smith, president of John Powell & Co.

The Edco insecticide plant was purchased outright and will be expanded and improved. It represents a further step in Powell's decentralization program, whereby strategically located manufacturing facilities will be able to offer swift service. Out of Elkton, Powell will be an important source of insecticide materials for southern New Jersey and neighboring Atlantic Coast areas, offering spot-delivery service to meet agricultural needs. This new addition will be managed by James Lyons.

Sale of this plant to the Powell company, it is emphasized by Edco Corp., will not affect production of their own line of finished insecticides and aerosols which will continue to be produced in a second plant which has also been operated by Edco Corp. at Elkton.

Clean Automatic System for producing blended INSECTICIDE DUSTS

THE RAYMOND Whizzer Equipped IMP MILL

Write for BULLETIN #68 Full details of Raymond Mills for Insecticides

This compact unit makes an economical installation for insecticide plants. It provides a clean, dustless system for automatically handling the material from feeder to finished product bin.

The Imp Mill is especially adapted for grinding and blending operations in producing field strength insecticides. A wide, yet closely controlled, range of fineness is easily obtainable to 95% or better passing 325 mesh. One simple adjustment controls fineness over the entire range.

Whatever your dust formulating problem may be, Raymond Equipment offers you an economy proved method of production.

COMBUSTION ENGINEERING – SUPERHEATER, INC.

1314 NORTH BRANCH ST.
CHICAGO 22, ILLINOIS

Raymond
PULVERIZER DIVISION

SALES OFFICES IN PRINCIPAL CITIES

NAC Board to Midland

The board of directors of the National Agricultural Chemicals Association was to hold an all-day meeting at Midland, Michigan on June 10, according to word from the Association headquarters in Washington, D. C. No particulars were given as to the agenda of the meeting.

•

Fertilizer Plant Expands

The fertilizer plant formerly operated by Purity Fertilizer Co. at Greenville, Alabama, is being remodeled and enlarged to a 9-bin capacity. It will be ready for operation in the late fall.

•

Acquires Butcher Co. Stock

Udylite Corporation, Detroit, Michigan, has entered into an agreement to acquire the outstanding capital stock of L. H. Butcher Company of Los Angeles and San Franciso. The Butcher company makes insecticides and plating material and equipment.

NAC Plans Fall Meeting

Dates for the annual fall meeting of the National Agricultural Chemicals Association have been set for September 3-6, at the Essex and Sussex Hotel, Spring Lake, N.J., according to Lea S. Hitchner, executive secretary of the Association, Washington, D.C.

Program plans have not been announced, but committee members indicate that "outstanding" speakers are to be featured. In addition to accommodations in the Essex and Sussex, the Association has arranged for a number of rooms in the Monmouth Hotel, adjacent to the meeting headquarters.

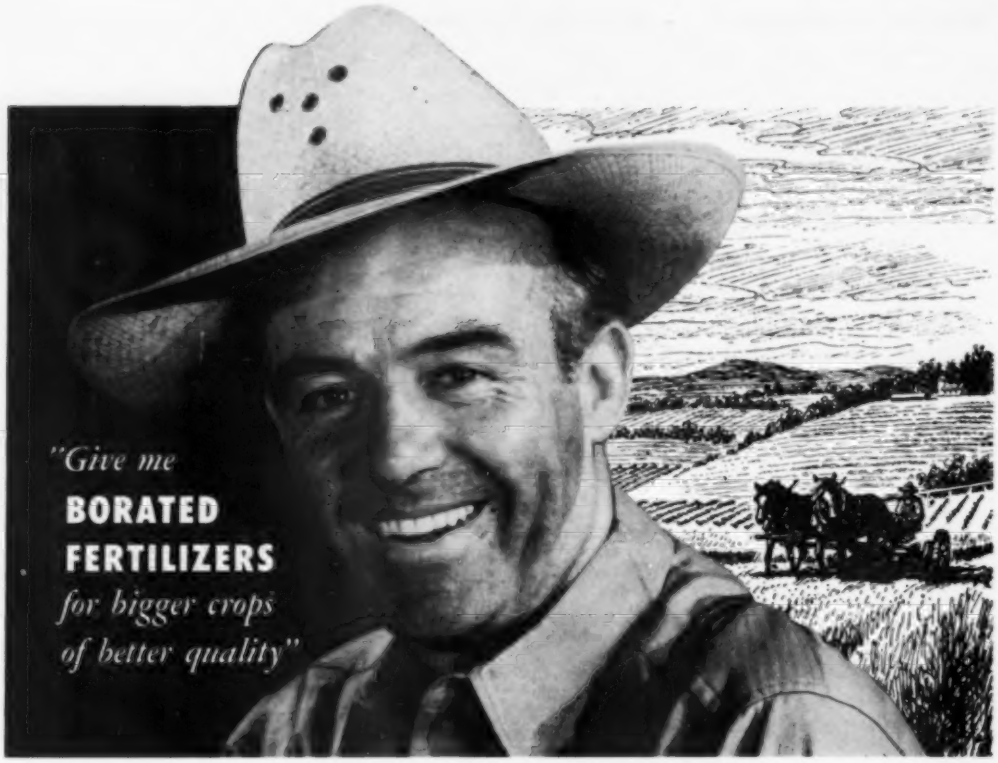
"AEROTIL"

(*Continued from Page 73*)

curs on such soils, application will be beneficial.

2. will not be effective on mucks or high organic soils.
3. will not cause striking improvement in structure of soils which are already in good tilth as a result of organic matter additions and other good management practices.
4. will probably not have appreciable effect if applied to established turf. Through further research it may prove practical to use "Aerotil" in connection with mechanical spiking or other means of cultivation which serve to bring the soil conditioner into direct contact with the soil. It should not be recommended for established turf until further research indicates its usefulness for this purpose."

Recently, the company announced that it is building a 50-million-dollar plant in New Orleans, Louisiana, to produce acrylonitrile from natural gas. It is now making the chemical at its Warners Plant in Linden, New Jersey.



BORAX restores lost boron to soil

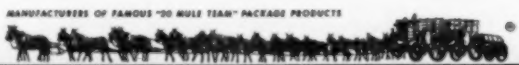
Yes, Borax does restore lost Boron to soils . . . the Boron that is so essential to fine, healthy crops and big yields. Although the amount of Boron required is extremely small, its importance is comparable to Nitrogen, Potash and the other essential plant foods. Don't let a Boron deficiency in soil cause crops to dwindle and plants to grow puny. Use Fertilizer Borates, the low-cost fertilizer grade of Borax, to restore the boron—then watch the yields of alfalfa, pasture crops, and many vegetable, field and fruit crops as well, increase and improve in quality!

FERTILIZER BORATE-HIGH GRADE, developed especially for the fertilizer trade, is an ore concentrate rich in Boron (*contains approximately 121% Borax equivalent*). In formulating mixtures containing Borax, only 82.9 lbs. of FERTILIZER BORATE-HIGH GRADE is required for each 100 lbs. Borax that you guarantee. Because water content is held to approximately 24% water (5 mols) this material also saves you important money in costs of transportation, storage and handling, etc.

FERTILIZER BORATE (*equivalent to approximately 93% Borax*) and FERTILIZER BORATE-HIGH GRADE (*equivalent to approximately 121% Borax*) come in fine mesh for addition to mixed fertilizer, or coarse mesh for direct application where required. County Agents or State Experimental Stations should be consulted for detailed recommendations. Write today for literature and price quotations!

FERTILIZER BORATE—The Low-Cost Fertilizer Borax

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS



AGRICULTURAL OFFICES
P.O. Box 229—EAST ALTON, ILLINOIS
First National Bank Building,
AUBURN, ALABAMA

PACIFIC COAST BORAX CO.
DIVISION OF BORAX CONSOLIDATED, LIMITED
100 PARK AVENUE, NEW YORK 17, N.Y. · 3295 LUMBER STREET, CHICAGO 16, ILLINOIS · 630 SHATTO PLACE, LOS ANGELES 5, CALIF.

Allen to Sprout, Waldron

Frank D. Allen has been appointed sales manager of the Western Pellet Mill Division of Sprout, Waldron & Company, Inc., Muncy, Pennsylvania, according to an announcement just made by Harold Alsted, vice-president in charge of sales. After June 1, Mr. Allen will establish headquarters for the Western Pellet Mill Division in the Kansas City area with offices located at 7423 Village Drive, Prairie Village, Kansas. Prairie Village is a suburb adjacent to Kansas City, Mo.

The rapidly increasing demand by processing industries for the Sprout, Waldron "Pellet Ace" and "Junior Pellet Mill" has necessitated splitting the pellet mill sales and service organization into an eastern and western division. This decentralized control for the western division is expected to give faster and more personalized service to Sprout-Waldron customers further removed from the plant manufacturing facilities.

In addition to having overall responsibility for the sale of Sprout-Waldron pellet mills in the western division, Mr. Allen will be in charge

FRANK D. ALLEN

of the sale of all the company's products except its line of refiners in the Kansas City area.

•

Henry Huschke, 51, Dies

Henry A. Huschke, 51, recently with the Office of Price Stabilization, Washington, died May 4 of a heart ailment. He was a graduate of Cornell University and came to Washington in 1930 as an agronomist with the National Lime Association. During World War II he served with OPA and later joined the Agricultural Limestone Association. He appeared as a speaker at the NFA meeting in Atlanta last November.

•

Cotton Recommendations

"Cotton Insect Control Recommendations for 1952" have been issued by the National Cotton Council of America. The bulletin contains a summary of each state's 1952 official recommendations as well as other types of information concerning insecticides, guides for application methods and precautions.

States covered by the booklet include Alabama, Arizona, Arkansas, California, Georgia, Louisiana, Mississippi, Missouri, New Mexico, N. Carolina, Oklahoma, S. Carolina, Tennessee and Texas. The booklet is available from the National Cotton Council of America, P. O. Box 18, Memphis 1, Tennessee.

A Preview of the

Pneumatic Bradley Hercules Mill

SOON TO BE OFFICIALLY ANNOUNCED

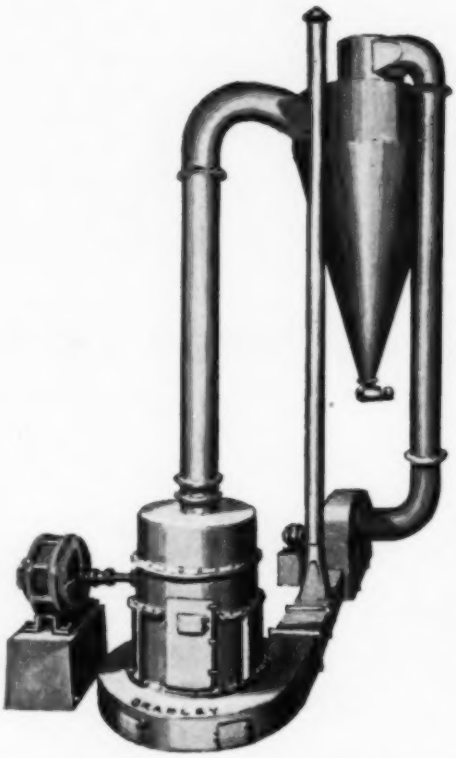
The famous **BRADLEY HERCULES MILL** that has been so successful in the grinding of Portland Cement and Agricultural Limestone has been redesigned through the addition of an Air System to meet the requirements of the Phosphate Rock Producer who desires a pneumatic type pulverizer for finer grinding.

This air-swept **BRADLEY HERCULES MILL** is not new and untried as it retains all of the excellent grinding features of the famous screen type **BRADLEY HERCULES MILL** and is unquestionably the most modern air-swept roller mill on the market.

Engineered and built by a company that has successfully manufactured pulverizing machinery for over 60 years.

Every user of fine grinding pulverizers will be greatly interested in the many excellent features of this latest addition to our well established line of pulverizers.

Our Engineers will help solve your grinding problems.



BRADLEY PULVERIZER COMPANY

SPECIALISTS in the MANUFACTURING OF PULVERIZING MACHINERY SINCE 1891

LONDON ALLENTOWN, PA. NEW YORK

Extend Cotton Quarantine

Plant quarantine regulations applicable to the movement of cotton, cottonseed and cottonseed products from Hawaii or Puerto Rico to the U. S. mainland have been amended and extended to include the Virgin Islands of the United States, the U. S. Department of Agriculture announced May 12. The new regulations became effective June 13. The quarantine was established to prevent the pink bollworm of cotton and the cotton blister mite from spreading to the United States.

•

Powell Opens Paris Office

A new office of John Powell & Co. was recently opened in Paris, France, according to an announcement by William Pollert, vice-president. The office, located at 56 Rue de Bassano, Paris 8, will become the European headquarters of Powell's overseas affiliate, John Powell International, Inc. The new office will be under the management of Claude Mouries, who has represented Powell in North Africa for the past several years.

•

Record Sulfur Output

A new production record was established in 1951 by United States sulfur miners. According to the U.S. Bureau of Mines, output of native sulfur totaled 5,278,249 long tons, an increase of 2 percent over 1950. Production exceeded 400,000 long tons in every month and reached the highest level during the third quarter in which the monthly average was 456,523 long tons. In the fourth quarter it dipped to an average of 430,096 long tons.

Over a period of years before 1951, producers' stocks declined continuously as sales exceeded production. By 1951, sulfur stocks were so low that they could no longer be drawn upon. Consequently, less sulfur was shipped from the mines in 1951 than in 1950. Apparent sales of sulfur in 1951 were 5,095,347 long tons which was 10 percent below 1950. Producers stocks totaled 2,837,432 long tons at the end of 1951.

"Acrylon" in Carload Lots

The availability of "Acrylon" soil conditioner in carload lots has been announced by American Polymer Corp., Peabody, Mass. The material has been manufactured by the company for the past four years, but was being used for other purposes. It is now available in both dry and liquid forms to manufacturers and distributors of garden and agricultural supplies.

The makers have stated that the soil conditioner is not to be sold directly to the consuming public, but rather, through manufacturers and distributors.

•

Century Plants Honored

Among some 231 awards presented to business firm which have been operating in New York City for 100 years or more, were several in the agricultural chemical and allied fields. These included H. J. Baker & Bro.; Chase Bag Co.; Fisher Scientific Co.; Innis, Speiden & Co., Inc.; and John Wiley & Sons, Inc.

PROTECTING MILK from farm to family with Pyrenone sprays*

ON THE FARM

ASSOCIATED DAIRY PRODUCTS COMPANY

February 15, 1952

Dear Friends and Patrons,

Newsweek Magazine of January 28, 1952 in the "Parade of Business Trends," carries this news item:

"Here's News for Dairy Farmers: Spraying your herds with a chemical called Pyrenone cuts losses of butterfat production during the fly season. Flies normally are responsible for declines of up to 50% in butterfat output during June and July. Spraying twice weekly with Pyrenone kills at least 90% of the flies."

We would like to call your attention to the fact that this item is not a paid-advertisement. It is an authentic news item, so carried by Newsweek.

In the building housing the show cattle at Arizona State Fair last fall, Pyrenone was used to control flies with highly satisfactory results as the writer personally observed; perhaps you saw this demonstration also.

Our plant is handling orders for Pyrenone Spray for the convenience of our patrons. Purchases may be charged against your credits for butterfat.

It seems probable that if we could adequately control our fly problem, we might be able to get a little better production during our long fly season and make a profit on the investment.

Sincerely yours,

ASSOCIATED DAIRY PRODUCTS CO.

By Karl A. Clark,
Sec'y.-Treas.

IN THE PLANT

Pyrenone* insecticides are formulated by manufacturers to meet specialized requirements — aerosols, emulsifiable sprays, powders, oil-base sprays, dusts. Properly formulated and applied, Pyrenone presents no hazard to spray operators, dairy employees, milk plant employees, or to milk or milk products. Specify Pyrenone sprays for your pest control requirements.

Pyrenone*

*Reg. U.S. Pat. Off.

*Pyrenone is a registered trade mark of U. S. Industrial Chemicals Co.
Division of National Distillers Products Corporation
120 Broadway, New York 5, New York
Branches in Principal Cities.
In Canada: Natural Products Corporation, Montreal and Toronto

Delmarva Meets June 28

Members of the Del-Mar-Va Penninsula Fertilizer Association will hold their annual meeting at the George Washington Hotel, Ocean City, Maryland, June 28, it has been announced. Governor Elbert N. Carvel, of Delaware, president of the Association, is expected to act as chairman of the meeting.

SOUTH CAROLINA

(*Continued from Page 56*)

tions in tobacco with varied applications of fertilizer. It was interesting to note that an optimum fertilizer and nitrogen application exists beyond which any increase in chlorine and nicotine in tobacco as noted by tobacco analysis is not economic. Dr. Bullock pointed out that an even more important factor than fertilization, type soil, or plant variety in tobacco growing is the seasonal effect on the plant.

Dr. W. R. Paden, agronomist, reported the work being done in the agronomy research program, to acquaint the farmers with new developments, and progress in the studies on soil deficiencies, soil aggregate stabilizers, and use of plant food to replace soil loss through leaching and run-off.

SUPPLIERS BULLETINS

(*Continued from Page 67*)

now available. Barrington jet mixers are designed for wet mixing liquids and solids and for emulsifying, homogenizing and dispersing applications. The catalog is available upon request to the company at 110 W. 40th Street, New York 18.

•

Offers Weed Control Chart

The western division of Dow Chemical Co., Seattle, has published a weed control chart with recommendations for 1952. The chart offers at a quick glance, the proper chemical control for various unwanted plants in crops such as wheat, barley, oats, rye, sudan, pastures, rice, corn, flax, grains, peas, woody plants and brush, brambles, poison oak, and tree stumps.

Full instructions are given as to the best time to use the weed killer and precautions are presented about mis-use of the chemicals.

•

Conn. Issues Pest Volume

The Connecticut Agricultural Experiment Station, New Haven, has recently published a new handbook on apple insect control, designated as Station Bulletin 552. Written by Dr. Philip Garman and J. F. Townsend, it contains biological data, description of damage and control measures for some 40 apple insect pests of the northeast. More than 80 photographs of the various pests are included to aid in identification. The bulletin is equipped with index tabs.

Because of the complete nature of the booklet, the Station makes a charge of $1 per copy. Checks or money orders, made out to the Connecticut Agricultural Experiment Station, should accompany all orders, the Station has announced.

These bags conform to I.C.C. 2-D specifications

from start... to finish...BETNER'S AHEAD!

AND... Betner *IS* ahead... in ideas and products. Betner prides itself on the new "Duo-Tite" bag, a bag that *positively won't permit* sifting. It's ideal for chemicals, fertilizers, insecticides, any bulk powdered material.

"Duo-Tite" bags can be constructed to hold 1 to 25 lbs.; can be printed up to four colors; can be made with combinations of materials.

The construction of the Betner "Duo-Tite" bag offers special liners, assuring "no-sift" of contents. The "Duo-Tite" bag is closed —top and bottom—with an inner-heat-sealed, double fold.

Drop us a line. We'll return samples promptly . . . with full technical information.

COMPLETE SERVICE!

Betner can supply the special machinery for closing the "Duo-Tite" bag . . . it heat-seals, double folds and pastes the tops in exactly the same manner as the bottom is constructed.

• **Whatever the packaging need, there's a Betner bag . . . FILL IT!**

Benj C Betner Co *Devon, Pa.*

***Plants also located in:* Richmond, Virginia; Paris, Texas; Appleton, Wisconsin; Los Angeles, California**

Sulfoxide Okayed by USD

The U.S. Dept. of Agriculture has approved the use of the insecticide synergist, sulfoxide, in aerosols. This approval was granted after a careful study of the laboratory data on the warm-blooded toxicity of sulfoxide and its insecticidal activity when combined with pyrethrins or allethrin.

In granting general approval for sulfoxide, the USDA also granted specific approval of four aerosol formulas submitted by the manufacturers of sulfoxide, S. B. Penick & Company, New York. The sulfoxide content in these four formulas varies between 1% and 5%.

The makers point out that this approval of sulfoxide offers new possibilities to insecticide manufacturers, because as much as 5% sulfoxide can be used in aerosol formulas, making possible high quality bombs, safe and non-irritating.

Sulfoxide is presently being used in the formulation of fly sprays, roach sprays, dairy sprays, livestock sprays, mill sprays etc.

HERBICIDES

(*Continued from Page 75*)

new field.

Some theorize that the treatment of all pedigreed cottonseed against "damping" might be a factor in the problem.

A Little Rock seed dealer reported that he has received so many orders for seed for replanting that there is danger of a shortage.

WASHINGTON

(*Continued from Page 57*)

UNICEF went beyond its orig nal concept in voting use of its funds to establish a state-operated industry, and that UNICEF had no right to set up a government plant without consulting industry first.

NACA emphasized that they were not opposing or protesting the public health aspects of the matter, but only the principle of using public funds to build government plants which conceivably might be in competition with private industry, or at least might discourage private industry from building in the area. On the other hand, U.S. and UN government officials explained that at the time of the first approval of the UNICEF plants, the supplies of DDT were extremely limited and foreign governments were having great difficulty in obtaining adequate quantities for their programs.

It certainly would appear that a well-planned and coordinated method of procuring technical DDT and other insecticides by UN, and similar agencies could be worked out so this type of shortage would not recur.

* * *

The Office of Materials & Facilities of USDA is completing a study evaluating the volume of pesticidal materials required in the U.S. for the agricultural years 1950, 1951 and 1951-1952. These results will be presented in detail in the July issue of AGRICULTURAL CHEMICALS *as a milestone in requirement figures for the use of these materials. The work*

was carried out under the direction of Dr. Harold H. Shepard, in charge of pesticides in OMF.

* * *

The 6th International Grassland Conference will be held at Penn State College, State College, Pa., August 17 to 23, 1952. The congress is sponsored jointly by the U.S. Government and the Food & Agricultural Organization of United Nations. Government agencies which are participating include the Departments of State, Agriculture, and Interior as well as the Mutual Security Agency. The grassland program offers one of the largest fields for expansion of agricultural chemical use, and the meeting should be attended by all in the industry who are interested in the world-wide expansion of agricultural pesticides. Members of the fertilizer and farm machinery industries will also be in attendance at these meetings and there will be exhibit space available as well as a full roster of speakers from all of the countries attending the meeting. The chairman of the organization committee is Philip V. Cardon, former Research Administrator of the Department of Agriculture.

* * *

The U.S. Department of Agriculture has been much in the news during the past several months with their Fifth Plate Program. The basis of the entire program is that the U.S. population may exceed 200 million for 1975. Therefore, for every four American citizens who sit down to a meal in 1950, there will be another 5th person—at the table by 1975. It is agriculture's job to fill what the Department of Agriculture chooses to call the keynote of this campaign, namely the Fifth Plate. The increases in production needed by 1975 represent approximately one-fourth of the amounts that we were producing in 1950. They do not allow for any improvement in diet, and while the U.S. is probably the best fed nation in the world, still there is much room for improvement among large groups of the population.

The program gets off on the note that for every 4 pounds of meat, 4 quarts of milk, and for every 4 eggs we have been producing, we will need another pound and another quart or another egg to supply the fifth person at the table by 1975.

The program as forwarded by the U.S. Department of Agriculture's Production & Marketing Administration calls for an increase of 25% over 1950 totals. The program makes allowance for some additional crop land coming into food production only to a limited extent. The burden of supplying additional crops to feed the additional population must be met by better crop yields, and this in turn means better agricultural practice including greater and more effective utilization of fertilizers, pesticides and other chemical aids to agriculture. Certainly on this basis, the pesticide industry has a very favorable and optimistic outlook during the next 25 years.★★

INSECT SITUATION

(*Continued from Page 65*)

County, N.J. Some hatching was observed May 1 in the lower Hudson Valley of New York and was complete by early May in the midwest.

Codling moths were emerging in numbers in Lawrence and Orange Counties, Ind., by early May. The first moths emerged in cages at Carbondale and Anna, Ill., on May 5, with emergence at Cape Girardeau, Mo., beginning the same date. In the Yakima Valley of Washington, cod-

ling moths were first taken in bait traps May 4.

The first reports of damage from the Oriental fruit moth were in early May with infested peach twigs noted in Lawrence and Orange Counties, Ind., and Carbondale, Ill.

Plum curculio adult feeding punctures in peaches were noted May 6 and 7 in New Jersey. The first larvae in peaches in Illinois were observed May 6. Egg laying and feeding punctures in apricots were seen in Central Missouri May 6, with egg laying punctures being observed at Cape Girardeau, Mo., April 29.

A report received in late April stated that the pear psylla was well distributed throughout the commercial pear-growing section of southern Oregon. By early May, this pest was very abundant and egg laying was heavy in Massachusetts. Nymphs were present in the Hudson River Valley and western New York.

Cotton Insects

EARLY May reports from Waco, Texas, stated that boll weevils continued to emerge in hibernation cages in comparatively large numbers. In only three years of the past 13 during which hibernation records have been available at Waco, has emergence at this time of year been greater than at present. (The years of higher emergence were 1941, 1945, and 1950.) The emergence in 1944 was the same as this year with the other years being much lower. Boll weevils were moving into cotton fields in Louisiana in early May and were reported to be causing damage to seedling cotton in Tift County, Ga. At Florence, S.C., 60 live weevils were removed from 10 hibernation cages during the week ending May 9 as compared with none in 1951, 117 in 1950 and 32 in 1949 for the corresponding period. A survey in North Carolina showed generally a decrease in the number of weevils that survived the 1951-52 winter.

Early season cotton bloom infestation records in the Lower Rio Grande Valley of Texas indicated that the pink bollworm infestation was the highest on record for that area.

The insect survived the winter in larger numbers in Texas than during any previous year. By May 1, of 161 inspected fields in the Valley area, 70 per cent were found infested. Fifteen to 25 per cent of the fields were sufficiently infested to warrant use of insecticides.

By early May, light infestations of aphids were found on cotton in the Red River Valley area of Louisiana. Aphid populations were increasing in the lower Rio Grande Valley of Texas and starting to build up on seedling cotton in New Mexico.

Control for thrips on cotton was necessary during early May in Pinal County, Arizona. The insect was reported as causing damage to cotton in scattered sections of south Texas, being heavy in the Shreveport district of Louisiana and building up on seedling cotton in New Mexico. The cotton fleahopper was found in damaging numbers in the Lower Rio Grande Valley of Texas in fields where no control was applied.

FUNGICIDES

(Continued from Page 63)

that all of these except "KF 467" were applied in slurry or liquid form.

"Ceresan M" (dust), copper carbonate, "Spergon," "Aagrano" (dust), "Phygon," "C & C 640," and "Anticarie," more or less in that order of effectiveness, were among the treatments that were fairly satisfactory at several stations where infection in the checks was high. "Vancide" and "Arasan" were somewhat less effective. "Agrox," "Leytosan," "Dynacide," and "L-224," while effective at some stations, failed at others and can hardly qualify as bunticides under conditions of severe infection. "Parsons' Seed Saver Dust," as has been shown in previous experiments, is almost worthless as a cereal seed treatment.

It would be difficult to explain satisfactorily the wide differences in bunt control obtained at different stations with some of the fungicides. For example, at Pullman, Bozeman, Aberdeen and Beltsville, and St. Paul, with infection in the checks averaging 97, 83, 93.5, 90, and 65 per cent, respectively, "Spergon" reduced it to less than 5 per cent at four of these stations but allowed over 25 per cent at Aberdeen. In contrast to this, "L-224" reduced infection at Aberdeen and Bozeman to less than half as much as occurred at Pullman. At Urbana with only 22 per cent bunt in the checks, "Agrox" allowed 11 per cent infection, while at Beltsville, where the check showed 90 per cent, "Agrox" reduced it to 0.8 per cent.

These and other seeming inconsistencies may be partly explained, perhaps, by the heavy spore load on the seed, combined with extreme variation in the environmental conditions that favor bunt development, fungicidal efficiency or both.

It goes without saying that few farmers would sow seed wheat carrying a 1 to 150 spore load, and therefore bunt control on the average

farm undoubtedly would be more effective than under these severe experimental conditions.

Results with Barley

DATA on the control of stripe disease in Atlas barley were obtained from only three stations (Table 2). All of the treatments used reduced the incidence of stripe-disease to less than 1 per cent, while eight of them eliminated it entirely. With possibly one exception, none of the treatments affected germination and emergence adversely.

Not enough smut developed in plants from untreated seed of Moore barley to produce significant data on smut control. At Beltsville, only one smutted head was found in the checks. At Fargo an average of 1.6 per cent (29 heads) appeared in the checks and ten of the treatments gave complete control. "Agrox" reduced infection to a trace (one smutted head), "Dynacide" to 0.2, "Mercuran A.L." to 0.3, and "L-244" to 1 per cent.

With the exception of "Agrox," none of the treatments affected germination adversely, even after sealed storage for 19 weeks.

Results with Oats

GERMINATION of oats in steamed soil was not appreciably affected by any of the treatments after storage for periods of one week and 18 weeks in open and sealed containers.

Five of the treatments, "Ceresan M" and "Aagrano" dust and slurry, and diluted "Panogen," reduced the average percentage of oat smuts to a trace, and one ("Panogen" concentrated) eliminated it entirely at all stations except St. Paul, as compared with an average of 21.5 per cent in the checks.

"Mercuran" dust was more nearly effective in oats smut control than was the liquid form. The opposite was true for bunt control. "K.F. 467," very effective in controlling bunt in wheat and stripe disease in barley, was disappointing in oat smut control." "Dynacide" and "Leytosan," both unsatisfactory in bunt control, were equally unsatisfactory for control of smut. "L-224," an excellent fungicide for corn and sorghum, apparently is not satsifactory for small grains.★★

SAFETY MEETING

(*Continued from Page 52*)

movement must start at the top . . . that management itself must be sold before best results can be obtained. A complete set of statistics for the industry must show real improvement before insurance rates may be reduced.

Objectives of the fertiiizer safety movement, according to Mr. Smith, are five-fold:

1. Reduction of accidents through the development of better practices.

2. Improved plant conditions.

3. Reduced insurance rates, both for compensation and fire.

4. Overcoming the problem of pollution.

5. Attaining higher morale of employees.

The speaker urged all fertilizer companies to join the National Safety Council, and to specify the "fertilizer section" when dues are paid, so that the section will get credit for the membership.

The problem of overhangs, one of the most troublesome from a safety standpoint, was discussed by J. D. Robins, superintendent, Virginia-Carolina Chemical Corp., Wilmington, N.C. He pointed out that overhangs "don't just happen," but are caused by the manner in which a pile of bulk material is worked. Cutting a trench with picks and undermining a pile is "asking for trouble," he said.

Despite its danger if mishandled, the use of dynamite is one of the safest means of breaking down a hardened bin of bulk material, Mr. Robins said. However, one must work from the top of the pile downward, and never blast the front of the pile.

Safety in use of dynamite, as well as other practices, must be the responsibility of top management. "You can't leave it up to the blaster, for no matter how much experience he may have, there is a strong tendency for him to get careless," Mr. Robins stated. He recommended that the blaster be put on the safety committee of the plant and thus keep conscious of his responsibilities. If he does get careless, the only thing to do is to replace him, Mr. Robins said, reminding that there is no place for thoughtlessness in blasting.

Use of CO_2 for removing and breaking up piles of material was discussed, with remarks from the audience stating that this material "pushes" the pile rather than blasting it. A drawback to use of CO_2 is its inability to reduce the material into small pieces, it was noted.

Safety With Ammonia

NUMEROUS angles on the safe handling and storage of anhydrous ammonia were touched on in a talk by Park Newton, Jr., president, Applied Engineering Co., Orangeburg, S.C. He reviewed some of the safety rules covering liquid nitrogen solutions and pointed out the difficulty of coping with physical properties of ammonia. The material can be handled safely *if all* the rules for procedure are heeded. That every single rule must be obeyed no matter how minor it may appear to the operator, was emphasized by the speaker who related a number of incidents where ammonia had been allowed to get out of hand through failure to note some small detail.

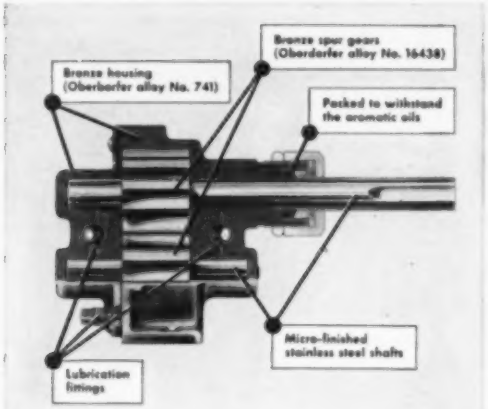
The odor of ammonia can be a great asset, however, since it can be detected immediately by workers who will usually get out of a contaminated area as soon as possible. A canister type, full face mask will protect a worker from concentrations of ammonia up to 3%, but above that a supplied air outfit is necessary.

Although it is impossible to design a system where the worker can't come into contact with ammonia, the men learn to respect it and to keep conscious of its potential hazard. It is largely management's business to keep the men reminded of the danger and to prevent their becoming careless through familiarity.

In the event of ammonia burns (actually, contact freezes the skin to cause the characteristic "burns"), treatment consists of immediate dousing with water. Always at hand for emergencies, should be respirator equipment, emergency showers and other water supply.

Regular inspection of safety valves, hose connections and tanks should be made in the interest of safety, Mr. Newton emphasized. He reminded that any copper or brass in any part which contacts the ammonia will be attacked by the material and will deteriorate rapidly.

The afternoon session, also under the chairmanship of Mr. Richardson, heard further talks on fertilizer safety. The chairman called on Paul T. Truitt, president of the American Plant Food Council, and Dr. Ed. Kapusta, National Fertilizer Association, both of Washington,



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D.C., for a few remarks. Each reiterated the interest held by his respective group in the over-all safety movement, and pledged a new full support for its objectives.

Tom Clarke, editor of the National Safety Council *Fertilizer Safety News*, presented his popular "safety quiz" in which the audience tells what is wrong from a safety standpoint, with each of a series of slides thrown on the screen. He then told about the safety publication and urged the industry to contribute to its columns stories about safety experiences in various plants.

S. F. Alexander, Swift & Co., Wilmington, N.C., spoke on safety factors involved in the acidulation of phosphate rock. Since the use of sulfuric acid is involved, safety measures must be observed continually. He divided into two general groups the factors which usually contribute to accidents in a plant. These were faulty behavior and faulty environment.

Under the former, he grouped the following items: inadequate job instruction; failure to comply with rules; failure to check details; failure of operator; and horseplay. The last item, although regarded lightly by many, is actually completely out of place in a plant where hazardous work is being performed. He told of several instances where irresponsible "jokes" resulted in serious injury.

Under "Faulty Environment," he enumerated these following points: defective equipment; faulty process of manufacture; unguarded equipment: poor housekeeping; poor lighting and ventilation.

The importance of good housekeeping in fertilizer plants was stressed in a talk by E. O. Burroughs, Jr., manager of the insurance department of F. S. Royster Guano Co., Norfolk, Va. He declared that a plant's general tidiness is usually an indication of its accident record, since it is almost axiomatic that good housekeeping means a good safety record.

Mr. Burroughs presented sketches of different departments in plants, showing the relationship between a cluttered factory and poor production and bad safety records. Sketches showed stairways covered with dust which become slick under certain conditions; fire extinguishers in out-of-reach places where they could never be used in case of a blaze; other fire extinguishers lying on the floor in a corner, empty; hazardous makeshift wiring where vibration wears off insulation; leaving unused pulleys and other parts at top of elevator shaft where vibration causes them to fall on heads of men below; and plants where no fire walls exist.

He said that all workers must be indoctrinated with the safety idea so that it becomes second nature for them to notice improper and unsafe practices in the plant. But, like other speakers, he emphasized that safety-mindedness must begin at the top and filter down through the superintendent, the foremen and thence to the men.

Shell Office Moves

The Newark sales district of Shell Chemical Corporation has moved its offices from the Raymond Commerce Building to larger quarters at 10 Commerce Court, Newark 2, New Jersey. There is no change in telephone number.

RYANIA

(*Continued from Page 47*)

festation of the tips of the ears, and the reduction in side damage is more important since it is more difficult to trim side damage than tip damage in the processing plant.

An indication of the need for more ear samples in this type of work is provided by the dust experiment for 1951. The untreated plots in this experiment showed an average of 14% tip damage which was one of two instances of lower percentage of tip damage than the percentage of side damage. In this particular case, 14% tip damage was as low or lower than any of the values found in the insecticide plots. Probably this value on the untreated plots should have been somewhere in the same range as the 28% tip damage found in the spray experiment.

Tip damage in the vicinity of Fairmont, Minnesota is primarily due to European corn borer, although the laboratory examination would not have distinguished between corn borer damage and corn earworm damage.

A comparison of the airplane application of insecticide dusts with ground application showed that ground application gave better control. In the airplane application, "Ryanexcel 15-0.5" was equal to or possibly better than any of the other insecticide dusts. The physical properties of "Ryanexcel 15-0.5" are probably better than those of 40% ryania for airplane dusting because of the fact that 40% ryania is too fluffy, which reduces the amount which can be loaded into the hopper and also increases the difficulty of applying the dust to the field at the exact spot where it is needed.

The use of ryania and "Ryanexcel" insecticides for control of European corn borer does not introduce undesirable residues on either foliage or the edible part of the corn. The testimony of Dr. A. J. Lehman of the Food and Drug Administration on May 22, 1950 at the Residue Tolerance Hearings in Washington included ryania and n-propyl isome among those "substances which are known to be deleterious but which, in my opinion, create no public health hazards if used in the ways described by witnesses under Part A as constituting good agricultural practice."

DDT and EPN may leave undersirable residues on the silage. Therefore, such silage should not be fed to dairy cattle because of the possibility of deleterious quantities of DDT appearing in the milk. Residues of parathion dissipate more rapidly and probably introduce no residue on silage if applied two weeks before harvest, but due to the toxicity of parathion, there is an occupational hazard during the application, and protective clothing and a respirator should be worn by those handling parathion. This is especially true if the material is handled day after day.

In conclusion the following insecticides fulfill the primary objectives of European corn borer control:

Ryania 40% dust at 30 to 35 lbs. per acre.

Ryanexcel 15-0.5 dust at 30 to 35 lbs. per acre.

Ryania 100% spray at 6 lbs. per acre.

Ryanexcel 96-3 spray at 3 or 6 lbs. per acre.

Parathion Wettable Powder, 15% at 3 lbs. per. acre.

SYSTEMIC ACTION

(*Continued from Page 43*)

desirable, it is not essential as evidenced by "Systox." The absorbed material must have a high toxicity for

insects but not for mammals or plants. OMPA is translocated throughout the actively-growing plant following exposure of roots, seed or cut stem. Transfer in the leaf appears to be only from the upper to the lower epidermis, but repeated application to the upper surface may result in movement of the chemical from leaf to leaf. Where plants are growing in a nutrient solution containing "OMPA," the "OMPA" concentration of the nutrient increases due to a greater proportionate uptake of water than of "OMPA." "OMPA" absorption by the roots may be inhibited by nutrient phosphorus even when the phosphorus is present in very small amounts. In the metabolism of "OMPA," plants and animals produce a more effective cholinesterase inhibitor than "OMPA" *per se*.

With "Systox," no evidence is available for such a "metabolic intoxication." Commercial use of the present phosphate systemics is restricted because of the unknown status of their mammalian toxicity when present in plant tissue. The pathway of metabolic breakdown of those insecticides which are absorbed by plants must be determined, and the mammalian toxicity of the intermediates evaluated before recommendations can be made for safe use on crop plants.

Summary: The plant is an active factor to be considered whenever insecticides are applied to crops. By absorbing insecticides, the plant may reduce their effectiveness or may convert them to more toxic compounds. Absorbed materials may be translocated to edible portions, making them toxic or possibly tainting their flavor. Crop yields may be reduced if the insecticide penetrating the plant is phytotoxic. On the other hand, the absorption and translocation of an insecticide by the plant may protect it from insect ravages. The degree to which each new insecticide may be absorbed, translocated and metabolized by the plant must be known. The use of radioactive tagged chemicals in conjunction with specific microchemical analyses should enable rapid research advances in this field. Cooperative efforts of entomologists, plant physiologists and biochemists are needed on the important problems related to the ability of insecticides to be absorbed and translocated by plants.

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3. *Crafts, A. S.* 1951. Movement of assimilates, viruses, growth regulators, and chemical indicators in plants. Bot. Reviews 17: 203-84.
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FERTILIZER SAFETY

(*Continued from Page* 32)

been somewhat overlooked. The safety organization wants every fertilizer manufacturer to analyze the economics of such a program. Such an examination will reveal some rather significant facts. For instance, that compensation insurance rates in the manufacture of fertilizer, are among the highest in the nation — almost on a par with oil-drilling operations. The rate for fertilizer manufacture is approximately six times the rate for oil refining. Is it possible that mixing and handling of fertilizer products is six times more hazardous than oil refining operations which include the processing of many flammable products and heavy-type maintenance work?

We feel that the comparative insurance rates for these two industries do not represent the true picture. The difference is, that the refining industry long ago recognized the hazards of its operations and has done something about them. The fertilizer industry can do the same.

The fire loss record of the fertilizer industry is not good, either. In some localities, it is difficult even to obtain fire insurance for fertilizer manufacture and fire insurance rates in general are excessively high. These rates, like those of compensation insurance, are established by the underwriters on the loss ratios over a period of time. Thus, it is not entirely their fault that costs are so high.

So it is, that these costs, coming directly out of the profits of business, are established on a nation-wide scale and no general reduction is possible unless a wide-spread improvement is noted in the incidences of fire and accident. Even if no other benefits were to be derived from the fertilizer safety movement, the program can be well justified on the reduction in insurance costs.

Among the goals set by the safety section for accomplishment in the fertilizer industry, are these:

1. Reduction in lost-time accident frequency and severity rates.
2. Reduction in workmen's compensation insurance rates.
3. Reduction in fire losses.
4. Lower fire insurance rates.
5. Safe and efficient work practices which will result in substantial reduction in operation and overhead cost.
6. Higher morale of employees.

Let us consider how these goals may be reached. The primary and basic step towards any good safety and fire prevention program is in the engineering design and policies of the company. Each fertilizer manufacturer should ask himself a number of serious questions. He should check and be sure that he is designing for safety of employees and for good fire prevention. He should ask himself, "Are all of my machines guarded properly?" Does the electrical equipment in my plant comply with the national electrical code for that type of exposure? When tanks and piping are installed, do we follow the recommendations of the API-ASME or its equivalent code in these installations? What provisions have we already made to make it easy for employees to work safely; for example, good ventilation, good lighting and good housekeeping? What consideration have we given to corrosion when purchasing equipment. Do we have fireproof construction in our plant and warehouses, and if not, is automatic fire control or extinguisher equipment installed?

It is natural for a manufacturer to regard the above list as being expensive and impractical. But any business suffering a fire knows how unprofitable it can be, too. After all, a fire can do more to interrupt continued supply of products to customers and affect costs more than any other cause.

In view of the present high fire insurance rates, it is imperative that the fertilizer industry consider employing the best design practices for fire prevention in the construction or remodeling of plants. The presence of adequate hand fire extinguishers is especially important for plants constructed of wood or other combustible materials. Training of employees on how to use fire suppression equipment is another important step. Adequate fire water systems for the expected exposure should be regarded as equally important as the operating equipment of a plant.

Until at least some of these matters are accomplished over a wide area, the present high compensation and fire insurance rates for the fertilizer industry will continue. In any case it must be kept in mind that such a general reduction in industrial injuries and fire losses must be evidenced and established over a considerable period of time before any real comprehensive lowering of insurance rates can be put into effect.

Isn't now the time for the fertilizer industry to unite in a concentrated nation-wide effort to eliminate the cause of industrial accidents and fires? The National Safety Council is now transmitting the fertilizer news letter and will also print and transmit data sheets and accident statistics when they are developed.

The conditions which need improving were not brought about over night, and neither can they be corrected in a short time. It is a job requiring united effort of top management from all sections of the country. Any fertilizer company not now a member of the safety council is urged to join. Mutual benefits are bound to come from universal support of this important movement. The program is needed from a humane and financial standpoint. The challenge is thus thrown out to the industry. Let's accept it!★★

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Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 175 Fifth Ave., New York 10. Closing date: 25th of preceding month.

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Agricultural & Industrial Chemical Salesman required by expanding firm. Territory-southern states, east of the Mississippi River. Prefer southern resident centrally located. Please state background and experience. Excellent opportunity. All replies confidential. Address Box No. 649, c/o Agricultural Chemicals.

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Plant Pathologist, Phd, desires position in sales and research development fungicides, Experience in extension and research. Married, age 43, will travel. Address Box No. 650, c/o Agricultural Chemicals.

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FOR SALE: 22 tons Bordeaux mixture, 12 x 4 lb. bags per carton. Excellent condition. 8¢ per lb. 1350 lbs. nictine alkaloid. $1.50 per lb. Barclay Chemical Co., Inc., 75 Varick St., New York City.

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New Plant for Quaker Oats

The Quaker Oats Company plans to build a $600,000 addition to its furfural manufacturing facilities in Memphis, according to Dr. Homer R. Duffey, vice-president in charge of chemicals.

The new unit will make furfuryl alcohol by processing further some of the furfural now produced at the plant.

Construction is expected to start late this year and be completed in 1953, Dr. Duffey said. Addition of the furfuryl alcohol unit will not require any increased production of furfural at the Memphis plant. Also, because of the continuous nature of the new process and its relative simplicity of operation, only a few additional employees will be needed to operate the unit on a 'round-the-clock basis, the company states.

The new unit will be approximately 2½ stories high and will cover an area 50 feet by 75 feet. Much of the equipment will be out-of-doors with only those parts which must be protected from the elements housed inside.

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Flying Farmers to Meet

The National Flying Farmers Convention will be held at the Alabama Polytechnic Institute, Auburn, Ala., August 27-30, according to L. O. Brackeen, of the Institute. Plans are being made for an informative and constructive program, he indicated. Details will be available later.

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To Represent German Firm

Robert J. Geary has announced his resignation from the presidency and board of the Geary Chemical Corporation, New York, and vice-presidency and board of the Chemagro Corp., to take a position in research and development of agricultural chemicals in the United States for Farbenfabriken Bayer, of Leverkusen, Germany. His new office will be at Blue Point, Long Island, N. Y.

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County Agent Retires

The retirement of Orley G. Bowen, agricultural agent in Middlesex county, N.J., has been set for August 1. He has been active as a county agent for 32 years, and is considered the "dean" of county agents in the state. He joined the Extension Service Staff of Rutgers University in 1919.

Advertisers' Index

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

MEETING CALENDAR

Conference on Use of Isotopes in Plant and Animal Research. Kansas Agricultural Experiment Station. Manhattan. June 12-14.

National Fertilizer Association. Greenbrier Hotel. White Sulphur Springs. W. Va., June 16-18.

Meeting of Advisory Committee of Fertilizer Section of National Safety Council. Greenbrier Hotel. White Sulphur Springs. W. Va., June 18.

American Plant Food Council. Homestead Hotel. Hot Springs. Va., June 19-22.

Pacific Branch. A.A.E.E.. Mar Monte Hotel. Santa Barbara. California. June 24-26.

Del-Mar-Va Penninsula Fertilizer Conference. George Washington Hotel. Ocean City. Md., June 28.

Friends of the Land. Conrad Hilton (Stevens) Hotel. Chicago. June 30. July 1 & 2.

Soil Improvement Committee. Pacific Northwest Plant Food Association. Pocatello. Idaho. July 9, 10 & 11.

Ohio Pesticide Institute. Ohio Agricultural Experiment Station. Wooster. Ohio. Aug. 13 & 14.

Sixth International Grasslands Congress. Penn State College. State College. Pa., August 17-23.

28th National Shade Tree Conference. Hotel Statler. Boston. Mass., August 18-22.

National Flying Farmers Convention. Alabama Polytechnic Institute. Auburn. Ala., Aug. 27-30.

American Phytopathological Society. Cornell University. Ithaca. N. Y., September 9-12.

National Pest Control Association. Rice Hotel. Houston. Texas. October 20-22.

Meeting of Fertilizer Section of National Safety Congress. Chicago. Ill., October 22 & 23.

Sixth Annual Beltwide Cotton Mechanization Conference. Bakersfield. California. Oct. 22-24.

California Fertilizer Association. Desert Inn. Palm Springs. Calif., Nov. 10-12.

National Fertilizer Association Fall Meeting. Roney Plaza Hotel. Miami. Fla., November 19-21.

Joint meeting. North Central Weed Control Conference and Western Canadian Weed Conference. Royal Alexandra Hotel. Winnipeg. Canada. December 8. 1952.

TALE ENDS

A RECENT play that opened in London based its central theme on the theory that insects have more common sense than humans. This little ditty entitled "Under the Sycamore Tree" was written by one Mr. Sam Spewack and, according to reviews, was rather puzzling, to say the least. Apparently, one of the most puzzling parts was telling the humans from the insects — however the insects (who, incidentally, were played by humans) wore antennae on their heads.

There seem to be several flaws in the thesis. If insects have as much common sense as the play gives them credit for having, then the science of logic might become a potent force in insect control. Entomology might be on the threshold of a new and revolutionary theory. Instead of spraying the insects madly with insecticides, one might simply set up a soap box and give a long lecture on the virtues of consuming weeds instead of wheat. The possibilities of an entomologist solemnly lecturing to a hoard of grasshoppers would be without parallel. There is one thing to say in favor of the new thesis however—apparently the insects had more common sense than to get mixed up in the idea in the first place—which is more than can be said for their human counterparts.

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A B. Pettit, Davison Chemical Corp., chairman of the Fertilizer Plant Safety Session of the recent Maryland State Safety conference, found himself in a difficult situation on the big day. His suitcase, containing a couple of suits, an assortment of shirts and other miscellany including an electric razor, was stolen from his parked car the evening before. Thus, on the day that he was to appear before the austere group of fertilizer executives from the area, he lacked a change of clothes.

Heroine of the occasion, however, was his secretary, Miss Helen O'Hara, who made a fast tour of Baltimore stores to get her boss some shirts, neckties, socks etc. in time for the meeting. Mr Pettit, in the meantime, had contacted friends in the clothing business and managed to get a new suit on short notice. He appeared at the session looking good as new, while the Baltimore police were supposed to be watching for some shady character dressed in "A.B.'s" good suit.

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"In New Orleans not long ago, there was a convention of fertilizer manufacturers. Naturally they had to elect a queen who would be known as Miss Something-or-other. You can see how this would give rise to a somewhat delicate situation. But after a great deal of thought, the agile minded gentlemen decided to call the queen of their choice Miss Plant Aid."

—Walter Davenport in *Collier's*

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